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Particle Size

CHEMICAL reactions involving solids not infrequently proceed at velocities that are dependent upon the exposed surface. Increase of surface can be secured by reduction in particle size, and for this reason the size of powders is of high importance in many industries. The porosity and the permeability of moulding sands depend on the properties of powders, so also do the rate of settling cement, the covering power and opacity of pigments, the inflammability and rate of combustion of coal dusts, the rate of solution and of chemical reaction, the efficiency of metallic extraction from ores, flotation processes and so forth.

Although the importance of particle size is well understood, the methods of measurement are by no means easy, and in some respects not altogether satisfactory. An interesting analysis of the subject was contained in a recent communication to the Institution of Mechanical Engineers by Dr. H. Heywood in the course of which most of the recognised methods are discussed. The investigator meets at the outset the problem that there is no standard definition of a "powder." A fine powder of the British Pharmacopœia is one passing through 85 meshes to the inch, and a very fine powder passes through 120 mesh. A high-grade Portland cement is thus to the B.P. a "very fine powder," but a high-grade pigment should nearly all pass through 300 meshes to the inch, and many other industrial powders should not exceed 20 microns or about 900 mesh.

Difficulties in ascertaining the size arise from the size distribution and the particle shape, and perhaps for this reason there is difficulty in separating the two stages of sieving when this method of analysis is used. In general, it is concluded that although subject to limitations and inaccuracies, sieving forms the most convenient method of grading powders down to a fineness of 200 mesh linear inch, and may be extended to 400 mesh. In the mathematical analysis of the process two stages are involved, the first being the elimination of the fine dust that will easily pass through the apertures of the screen; this fine material is eliminated at an approximately constant rate. The second stage is the elimination of the particles that will only just pass through the apertures when in a favourable position. It is concluded, probably because of the second

class of particle, that sieving to completeness is impossible, and it is therefore necessary to define the end point of the operation. When the material to be graded is specific and its fineness is not likely to vary greatly, a standard time of sieving may be prescribed; otherwise the sieving must be terminated either when the weight of powder passing the sieve per minute is less than a certain percentage of the total sample (the American Society for Testing Materials specifies 0.1 per cent.), or is less than a certain percentage of the weight of the residue on the sieve. A practical point of interest is that screening with round holes has been shown by Dr. Heywood to be about 25 per cent. more rapid than screening with square mesh sieves, because the particles have an additional degree of freedom with respect to the attitude in which they are presented to the screen.

The fineness analysis of sub-sieve particles is based on a knowledge of the laws relating to the velocity of fall and the size of the particle under known conditions. It is a complicated process, for in practice of course the terminal velocity of the particle is dependent upon its size, shape and density, upon the density and viscosity of the fluid, upon the gravitational attraction on the particle, and upon whether the fluid flow round the particle is viscous or turbulent. The principal methods used are either elutriation in an upward current of water or air, or sedimentation, which involves the measurement at given intervals of time of the concentration at a certain level, or of the mean concentration between two levels. Elutriation appears to be most suitable for heavy powders, especially sand and metallic ores. Dr. Heywood's researches on the sedimentation method lead him to the conclusion that the most accurate method is to withdraw a small sample by a pipette from a given level and to determine solids by evaporation.

Other principles that have been used for fineness determination are the determination of surface by rate of solution and absorption methods, particle-size measurement by X-rays and electron diffraction, measurements based on the bulk density of the powdered materials and porosity and colour measurements of mixtures of powdered materials; the time of oscillation of a test-tube containing a suspension of the powder, which changes as the powder gradually falls, has also been used.

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Microchemical technique marks an advance in methods of analytical chemistry comparable with the effect of the introduction of anaesthetics on the progress of surgery. There is no analytical laboratory where some of the micro-methods could not be introduced with advantage.... It is not generally realised that inorganic quantitative micro-analysis is now sufficiently developed for its widespread adoption, not only in research but in industry.

—J. W. Matthews.

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NOTES AND COMMENTS

Anglo-German Trade

THE important point that a prosperous export trade does not depend on achieving success at the expense of other countries, but on world conditions, was made by Mr. R. S. Hudson, at the annual dinner of the German Chamber of Commerce for the United Kingdom held in London on Tuesday. The Secretary to the Department of Overseas Trade reminded his audience that as long ago as 1886 a British commission had reported that the perseverance of German traders was increasingly felt. Our own industrialists had responded to the challenge, with the result that both countries had obtained a steady advance in their overseas trade. What we now desired was not development to the detriment of other countries, which could bring no lasting benefits, but a world-wide growth of international trade arising from healthy competition under economic conditions. So long as Europe was in a state of tension trade could not be expected to prosper, but Mr. Hudson still hoped that, despite all the difficulties that seemed to beset them at the moment, they would succeed in reaching a "reasonable and satisfactory settlement" of the problem of Germany and Great Britain in the world markets.

Artificial Trading Methods Fundamentally Unsound

THE German Ambassador, Dr. von Dirksen, pointed out that the Anglo-German trade agreement made last July would prove to be a very solid foundation, and he believed that the difficulties still existing were not insurmountable. The ties of trade which had existed between the two countries for many decades should prove a valuable asset for new efforts. While it is, of course, idle to deny that German trading methods are causing anxiety to British exporters, the whole business community will echo the hope that a normal basis may soon be restored. Artificial methods cannot, in the long run, pay any country, and the sooner this is realised in Germany the better for her own interests as well as for the rest of the world.

The Chemical Side of Textile Manufacture

THE selling power of a textile material naturally depends upon its appearance, handle, resistance to wear and similar qualities, and while the mechanical side of production, for example, weaving or knitting, may be modified so as to give a variation in texture, the main qualities by which the value of a textile is judged are very largely due to the chemical treatment during manufacture. Thus, the chemist has always occupied a most important position in the eyes of the industry. His contributions to its progress have been of great significance; the dyestuffs industry, originally created to meet the demands of the textile manufacturer for colour, has gone ahead so rapidly that it can now be said that any textile fibre can be dyed in almost any colour with completely satisfactory results. In the textile industry itself an epoch-making change took place with the introduction of artificial fibres which necessitated entirely new technique in dyeing and finishing. With what success these problems have been met can be seen from the high quality artificial silks now available in every conceivable finish and colour. More recently the production of a textile fibre solely from synthetic resin was announced. This achievement which

marks the first wholly synthetic fibre as opposed to the semi-synthetic fibres based on cellulose and its derivatives may well lead the way to further, as yet undreamt of, developments. Although many artificial fibres are termed "substitutes," it is the generally accepted view that they are not so much substitutes as additions to the already-existing range of textile materials. The position is analogous to that of natural and synthetic resins, and as the natural resin producer is finding it necessary to improve and standardise his product to meet the competition of the synthetic resin maker, so in the same way the manufacturer of textiles from natural fibres is paying even closer attention to the quality of his product and the bleaching, finishing, etc., operations involved. An ever-increasing number of textile materials (both natural and artificial) are appearing; and while no single one can be regarded as a substitute for another they naturally compete in the market. Improvements in manufacture and chemical processing such as bleaching and finishing, are thus assuming still greater importance at this time when the industry is making such rapid progress. Recent developments in bleaching and finishing agents are described in articles in the present issue.

Price-Cutting

AT last week's annual dinner of the Paint and Oil Section of the Glasgow Chamber of Commerce, Mr. W. L. F. Shaw made a plea for the raising of the general level of selling prices, and the elimination of cut-throat competition, in the oil side of the paint and oil section. He pointed out that it was essential to maintain an economic level of selling prices if business was to progress, yet some continued to throw away their goods, and the buyer could not be blamed for taking advantage of this state of affairs. He asked whether there could not be co-operation in the trade to arrive at an arrangement whereby a reasonable margin of profit on their goods could be obtained. There are many examples where this kind of situation has been successfully met by trade organisation, for instance, the establishment of the Cement Makers' Federation put an end to price-cutting in that industry. Reasonable competition is a salutary pruning process, but the dangers of over-pruning are well known. When this occurs, as in uneconomic price-cutting, collaborative effort on the part of all concerned is the only efficient remedy.

World Rayon Production

THE world production of rayon reached a new high level in 1938 with an output of 1,900 million lb. compared with 1,823 million lb. in 1937. American production was nearly 258 million lb. as against slightly more than 321½ million lb. in the previous year. An interesting feature of the figures is the large increase in the output of staple fibre. Last year's total world production was made up of 975 million lb. of filament yarn and 925 million lb. of staple fibre, while the corresponding figures for 1937 were 1,205 and 618 million lb. respectively. It will be seen that the increase in total production was not accounted for by increases in both categories, but that the very substantial growth in staple fibre production was partially balanced by the falling-off in continuous filament output. This is a significant trend and indicates the growing popularity of spun staple fibre products, either as such or in admixture with other natural and artificial fibres, for artificial wool and similar materials.

Recent Developments in Textile Bleaching

By
G. S. RANSHAW

AN enormous amount of work continues to be done on the bleaching of textiles, but in spite of important results no one method has emerged as standard. This is partly due to the apparently conflicting directions in which investigations are being pursued. There is on the one hand the school which strives to apply the hypochlorite bleach to silk and wool, displacing the usual peroxide bleach in the interests of economy; on the other hand there are those who strive to replace the hypochlorite method employed with cellulosic fibres with the more expensive hydrogen peroxide in the interests of superior results.

This state of affairs has had one beneficial result in that it has led to improvements in many directions, whatever the bleaching method adopted. The very important question of the best stabilisers for peroxide solutions has received the largest amount of attention; then there is the question of the best material with which to construct bleaching apparatus, which has also been thoroughly investigated. Attention too has been devoted to discovering an efficient method for preparing hypochlorite bleaching liquors on the bleachcroft premises, thus saving transport costs.

Wool and Hypochlorous Acid

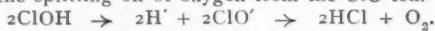
The difficulties attending the use of hypochlorite solutions for wool bleaching originate less in the sensitivity of the chemical substance constituting the wool than in the varied possibilities of reaction inherent in chlorine bleach liquors. As with the action of hypochlorous acid on cellulose fibres, three principal reactions can be said to occur when it is used with wool: oxidation, chlorination, and addition of hypochlorous acid to double bonds of organic substances. These reactions are simultaneous; none can be completely eliminated. Here lie the difficulties accompanying the use of hypochlorous acid with protein fibres, since it is possible to influence the course of the reaction only so far as one reaction is accelerated or intensified in relation to the others.

Since the splitting off of chlorine from the hypochlorous acid only takes place when the latter exists in molecular form, it is necessary to avoid the possibility of dissociation of the acid in order to increase the chlorinating effect. This possibility is realised when the number of hydrogen ions in the solution is increased, i.e., by the addition of acids.



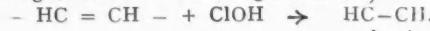
This reaction, which predominates in acid solution, is the sole technical type of chlorination which does not seriously damage the wool.

In neutral solutions, in consequence of the dissociation of the hypochlorous acid, the oxidising action predominates, due to the splitting off of oxygen from the ClO ion.



Weak oxidation of the wool is of some significance in finishing technique. It serves to increase lustre, to inhibit felting and to increase dyestuff affinity.

The hypochlorous acid can react in a third way, namely, by anchoring at double bonds of organic bodies, as follows:—



This additive reaction, which predominates in alkaline media, together with over-oxidation, exerts the strongest attack on the wool.

The Peroxide Bleach

The peroxide bleach is not yet practised in this country to the extent to which it is entitled. Abroad, where great progress has been made, two systems are in use. The caustic alkaline peroxide bleach is used for vegetable fibres and the phosphate alkaline for animal. The liquor used in the first case must be stabilised so that the oxygen is evolved in uni-

form fashion and therefore waterglass (sodium silicate) is added. This forms calcium and magnesium silicates with any lime in the water and these exercise the stabilising effect. The second type of bleach contains the peroxide along with a mild alkali, such as sodium phosphate, which itself stabilises the liquor.

The peroxides used are hydrogen and sodium peroxides. The former is used with either animal or vegetable fibres and the handle of wool so bleached is especially fine owing to the neutral condition of the bath. Sodium peroxide is used occasionally with wool, but it is preferred for cellulose fibres since the Na_2O_2 decomposes in the water giving H_2O_2 and NaOH , which economises in alkaline additions. The main advantages are economy (certain processes being eliminated) and fibre preservation (the possibly deleterious effects of the alkali boil on cotton being absent).

The Search for an Ideal Peroxide Stabiliser

With certain exceptions, H_2O_2 is employed at a concentration of 0.3 per cent. in presence of a stabilising agent. The greatest inconvenience in its use being the necessity for these.

Hydrogen peroxide in its pure state is very stable and even at elevated temperatures its rate of decomposition is very slow indeed. Thus, in the case of 30 per cent. H_2O_2 obtained electrolytically and heated for three hours at 75°C . the loss of H_2O_2 is not greater than 0.5 per cent. On the contrary, when the product is not pure its decomposition is inevitable and is more rapid under the influence of daylight or high temperatures.

The number of substances proposed as stabilisers during the past few years in various countries is very large, the multiplicity being explained by the fact that many substances exert a specific effect on the impurities present in hydrogen peroxide. H_2O_2 being a very feeble acid is more stable in acid media than in the presence of alkali, hence commercial hydrogen peroxide is always acidified by a mineral or organic acid, or a body of acidic character. The best-known acid stabilising agents are phosphoric, boric, acetic, salicylic, tannic, oxalic, barbituric and sulphuric acids, together with urea. Then there are lactic acid, phenols, acetanilide, phenacetin. With phosphoric acid a stability is reached such that the 100 volume solution only loses a maximum of about 2 per cent. after a year's storage. In the case of acid stabilisers the addition amounts to about 0.1 per cent. Certain salts and esters also exert a stabilising effect. Sodium benzoate, acetamide, phthalimide and phenylurea have all been proposed, while patents cover the use of the acyclic esters of amino-oxyacetic acid, resorcin and *p*-acetylaminophenol.

Advantages in the Use of Phosphate Stabilisers

Special interest attaches to the different salts of phosphoric acid, which form complexes with hydrogen peroxide. The phosphates have been shown to be more efficacious than sodium silicate. Pyrophosphate of soda, for instance, is an excellent stabiliser up to 70°C . It has also been found that the salts of sulphonated alcohols and bodies like Igepon T have a pronounced stabilising effect. Patents cover the use of the magnesium, aluminium and alkaline earth salts of sulphonated aliphatic alcohols in many countries, and certain proprietary products are based on these.

Metaphosphoric acid is said to have a superior stabilising effect to the other phosphoric acids, as it also has the power to maintain any lime salts in solution. In this way the disadvantages of bleaching with hydrogen peroxide and soap in unsoftened water can be avoided. The metaphosphates also have the advantage that they exert their stabilising action both in acid and alkaline solution, a fact which is of capital importance since acid stabilised peroxide is very slow in its

bleaching effect and one is obliged to give it an alkaline reaction just before use.

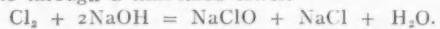
The action of stabilising agents which fix the oxygen in alkaline solutions has also been utilised, and for this purpose magnesium silicate has been recommended, as has the admixture of soluble glass to sodium pyrophosphate. Furthermore, the use of magnesium or aluminium oxide with sodium metaphosphate has been covered, while in another patent the addition of salicylic acid to sodium pyrophosphate is suggested. A mixture of pyrophosphate of soda and magnesium silicate is occasionally used.

Another group of stabilising agents comprises the class of catalyst poisons, such as aniline (0.2 per cent.), acetanilide, acetyl-*p*-phenetidine. Moreover, certain substances usually employed as protective colloids have a stabilising effect on hydrogen peroxide, notably soap (0.2 per cent.), starch, gum tragacanth, agar-agar and glucose.

The Electrolytic Bleach

Turning now to the actual hypochlorite bleach commonly employed, the attention of the industry is always focused on any new process which holds out a hope of economical production of the bleaching liquor on the works premises.

A classic method consists of reacting gaseous chlorine (from bottle liquid chlorine) with caustic soda which is allowed to percolate through a flint-lined tower.



It will be seen here that half the chlorine is lost and the sole advantage of the method is the possibility of obtaining liquors with a large sodium hypochlorite content. In certain cases this can counterbalance the poor yield from the cost point of view.

A second process, which is more attractive, consists in submitting a solution of sodium chloride to electrolysis, a method forming the basis of the so-called electrolytic bleach. Sodium chloride decomposes into Na and Cl. The sodium in contact with the water gives caustic soda, releasing hydrogen, and the chlorine coming off at the positive pole combines with the soda, thus:—



The yield here is only around 50 per cent. but this is not inherent in the principle of the operation itself; it is in large part attributable to the conditions under which the electrolytic treatment is conducted. Thus the electrolytic treatment, theoretically superior to the chemical, has not yet succeeded in displacing it.

A new process developed recently in France, however, deserves mention as holding out greater hopes for the commercial exploitation of the electrolytic method than any other. It is based on the instantaneous auto-depolarisation actuated by the force of the hydrogen formed in the course of electrolysis as it ascends in a specially constructed apparatus. To this end the electrolytic cell is surmounted by two vertical tubes communicating at the top. The liquor dragged upwards by the hydrogen is constantly in circulation, mounting by one of these tubes and returning to the electrodes by the other. Oxidation is thus as complete as possible, giving a maximum yield. Moreover, all exterior evolution of chlorine is avoided.

The electrolytic cells, or oxidising chambers, are constructed of reinforced concrete and the electrolysing equipment consists of an alternation of graphite plates constituting the anodes and cathodes of sheet iron arranged in the fashion of accumulator plates, their area being calculated for optimum use of the energy available.

The most economical method is to utilise the electrolyte itself for bleaching by continuous circulation, 80 per cent. of the sodium chloride used being recovered.

Materials for Constructing Bleaching Plant

The successful textile chemist of to-day is not content to possess a knowledge of textiles and chemicals generally, but requires also to understand something of the physico-chemical

properties of the materials used in the construction of his apparatus and machines. Amongst these the foremost place is taken by the new rustless and acid-resisting steels.

As regards the use of these in connection with the various liquors used in textile wet processes our knowledge is pretty well complete. The chromium/molybdenum or chromium/nickel type is most suitable for acid wash baths and also for weak acid baths such as the dilute HCl bath used for souring after bleaching. For strong acid baths, *i.e.*, strength greater than 0.6 per cent., the chromium/nickel/manganese steels are recommended, as also for bleaching baths. Peroxide baths containing 0.2 to 0.5 gr. per litre active peroxide for bleaching cotton or rayon mixtures require a chromium/nickel or chromium/nickel/molybdenum steel as it exerts the least amount of catalytic effect. Alkaline and neutral dyebaths, *i.e.*, for indanthrene and sulphur dye liquors, should be contained in chromium/molybdenum or chromium/nickel baths. Chromium/molybdenum steels are specially suitable for parts such as winch bars which are not welded. Acid baths need the chromium/nickel/molybdenum type of steel.

Considerable work has been done on other non-corrosive materials such as Monel metal, Inconel and pure nickel for the construction of bleaching apparatus, the subject being most conveniently dealt with under two heads, namely, bleaching with hypochlorites, and bleaching with peroxides. In a comparative study of the bleaching operation conducted in Monel metal and nickel vessels respectively, the following factors were analysed:—

- (a) The effect due to the concentration of active chlorine.
- (b) The effect due to the period of actual contact with the liquor at any time.
- (c) The effect of the condition of the surface of the metal.
- (d) The presence of agents that inhibit corrosion, *e.g.*, sodium silicate.

The principal differences between the peroxide bleach and the hypochlorite process are the non-corrosive nature of the peroxide solutions and their sensitivity to agents which bring about their decomposition. As peroxide solutions are non-corrosive, in practice the effect on metals is less important than the effect of the metal on the peroxide. The principal factors affecting the stability of the peroxide are: (1) temperature, (2) pH, (3) alkali present, (4) material to be bleached, (5) the water, and (6) the bleaching vessels.

Results show that, for the bleaching processes considered, Monel, nickel and nickel-plated steel can enjoy a long life and can be well adapted to structural requirements.

Further comparison may be made between Monel metal, Inconel and pure nickel for the construction both of bleaching and dyeing apparatus. Pure nickel is used, of course, principally as nickel-plated steel, only the nickel coming into contact with the solutions used. Tests with Inconel have shown that it withstands well the corrosive effect of many chemicals used in the wet treatment of fabrics. It is still too early, however, to estimate the place which it will eventually assume in the textile industry here. Much of it is expected in America. To the excellent behaviour of Inconel in contact with wool colours is to be added the ease with which it is manipulated and its welding capacity, *i.e.*, the very characteristics which mark Monel metal. It can also take a fine, lasting polish.

Finally, as regards nickel-plating on steel, apparatus so constructed is at present in operation where the goods are boiled in a bath made up from castor oil and soda, bleaching following with a solution of hydrogen peroxide and sodium silicate. The results over twelve months are said to have been entirely satisfactory.

AN arrangement has been entered into between the Union Minière du Katanga, the leading radium producer of the Belgian Congo, and the Canadian Eldorado Company, whereby 60 per cent. of radium sales will be allocated to the Belgian company and 40 per cent. to the Canadian.

Some Recent Developments in Finishing Assistants

A Year's Progress Reviewed

By
HERON WOOD

THE past ten years have been significant ones for the textile industry; indeed, it is difficult to refrain from the constant use of the word revolutionary in reviewing them. The past year, moreover, has been no exception to the rule, with at least two major and several minor accomplishments to its credit.

Strangely enough, most of the developments have not germinated within the industry itself, strictly speaking, but have been sponsored by outside manufacturers whose main interest may lie elsewhere, but who desire to foster every outlet for their products (chemicals, dyestuffs, construction materials) and so turn to the dyeing and finishing section of the textile trade as one offering innumerable opportunities for improvements and innovations. How far the trade as a whole is receptive to the new ideas offered so prolifically can only be judged by the sales records of those anxious to sell to this market, but it is certain that no other industry in the country has so much work done without obligation on its behalf.

It is impossible to review here every development which possesses significance, and our selection must be based partly on personal predilections. Having followed the fortunes of some thousands of textile assistants and auxiliary products since the early days of Sulphonated Lorol, it is natural to commence with the latest developments in this field. This brings us at once to the Igepals, introduced early last year by the I. G. concern in Germany. Here, at the outset, we encounter a revolutionary conception successfully put into practice, *i.e.*, that of a material possessing all the attributes and none of the disabilities of soap, a material produced by pure synthesis, and characterised by the entire absence of the fatty acid basis common to all detergents usefully employed hitherto.

New Soaps without the Fatty Acid Basis

The properties of a soap are a result of its chemical constitution and the physical condition of its aqueous solutions. The fatty acid basis, *i.e.*, the presence of the carboxyl group, is, however, also responsible for its drawbacks in use. In an article in THE CHEMICAL AGE (August 14, 1937, 133) G. S. Ranshaw traced the history of efforts to eliminate these drawbacks, *e.g.*, poor lime and acid resistance. In one respect, however, the newer products failed as compared with soap: they were unsuitable for use in milling woollen fabrics. Hence arose the problem of making a soap with the milling properties of fatty acid derivatives, but without starting on a fatty acid basis.

An intermediate stage on the road to success was reached when German chemists produced Medialan A, which had good hardness resistance, higher acid resistance than soap, high levelling and scouring properties, and *good felting power*. In two further products, however, Igepal C and Igepal W, the fatty acid basis was entirely relinquished. Igepal C is specially suitable for vegetable fibres and the various synthetic fibres (acetate excepted), and Igepal W for woollens. Features of Igepal C are its easy solubility (simple mixing with water in any ratio is sufficient), resistance to lime soap formation in water of *any* hardness, and practically unlimited resistance to metallic salts of any kind (this property makes it particularly useful for clearing prints in which metallic mordants have been used). It has a pronounced wetting action, cold or warm, in alkaline or neutral baths, and exerts an excellent scouring action on textile fibres with a cellulose basis, removing oils, solid fats, dirt and loosely-adhering dye stuff. It also exerts a protective colloid action on the lime salts of ordinary soaps.

Igepal W has similar properties and has a favourable action

in wool processing in that *with* soap for milling it prevents lime soap formation and thus economises in soap, besides assisting in clearing the fabric finally.

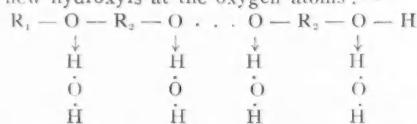
As has been said, the Igepals are purely synthetic, not being built up on natural substances as are the fat derivatives. They are entirely different from any material known heretofore for similar uses and are *not ionogenic*. The general formula has been given by the Austrian chemist, Dr. A. Chwala, as:—



Here, R_1 is a hydrophobic aliphatic straight or branched chain hydrocarbon residue which functions like the hydrocarbon chain in the long-chain, soap-like colloid electrolytes. R_2 represents short-chain units, usually C_2H_4 , each connected with the rest by ether oxygen bridges, except for the group at the end of the molecule, which is usually a hydroxyl.

Influence of the Hydroxyl Groups in the Igepals

The influence of the terminal hydroxyl is not sufficient, however, to make the long chain soluble. The solubility of the non-ionogenic groups depends more on residual valencies forming new hydroxyls at the oxygen atoms:—



This takes place only in aqueous solution, and the new hydroxyls are not really a part of the molecule, like the hydroxyl originally present. As a result there is a weak negative charge distributed at different points along the molecule, the effect at the interface resembling that produced by a soap-like colloid electrolyte. The result is detergency, wetting power, etc.

It would be impossible to record here all the substances and compounds which have been put forward during the year with a view to their application in one or more fields of textile processing. It is best, therefore, to mention a few which appear to possess an element of novelty, give promise of a reasonable degree of permanency, or have proved themselves in other ways. The list does not pretend to be selective except in so far as it is representative.

Some of the Year's New Textile Assistants

Albatex BD (Clayton Aniline).—One of the most successful agents used to inhibit the action of reducing agents, and employed in resist or discharge printing. Prevents bleeding of the colour into the white where kier-boiled goods contain coloured yarns. A white powder, readily soluble in hot water to give neutral solutions.

Amoa A₃ and *A₅* (Amoa Chemical Co., Ltd.).—These are amongst the latest liquid emulsions produced by a specialist concern. Amoa A₃ is readily soluble in any water and is stable to alkalies, its employment being in the emulsification of oils used in wool preparation, the fine, stable emulsions obtained giving a more uniform coverage and therefore improved lubrication, with less danger of oxidation. A₃ may also be used to emulsify paraffin wax, xylol, pine oil, turpentine, olive and caster oils, etc., for their usual purposes. The A₅ brand is miscible with water, and, used with petrol, paraffin or turpentine, produces an excellent softening effect. It aids penetration and wetting, and may be used for silk soaking.

Amoa ABW (Amoa Chemical Co., Ltd.).—An odourless wax and fatty alcohol emulsion for softening textiles, and for filling purposes. Its chief advantage is that it may be

applied in the dye-bath if the latter is not too strongly acid or alkaline, and in this capacity it has a retarding effect on colours which take too rapidly, thus promoting level dyeing.

Amoa Solo-Prufe (Amoa Chemical Co., Ltd.)—Not entirely new, but a very efficient one-bath impregnating agent for water-proofing. It is a concentrated emulsion containing waxes, metal soaps and a softening agent. Used alone or in conjunction with aluminium acetate or formate.

Antimucin AN (Sandoz).—This brownish paste with a slight odour, soluble in water, is a strong antiseptic and preserving agent. Used as an addition to finishing or sizing baths containing starch or glue. Protects from mildew or strain. No harmful physiological characteristics.

Aquaresin (Rex Campbell).—This is a water-soluble, non-drying resin (glycol-bori-borate type) introduced from America as a textile lubricant for finishing fabrics. Advantage is complete solubility in warm water, so that it is equally easily removed. Non-tacky.

Bedafin D (I.C.I.).—This is said to be a dispersion of a thermoplastic synthetic resin giving clear, colourless, flexible films. Suggested as a finishing agent for all textiles, giving a full handle. The degree of stiffness is dependent on the concentration of the agent used. Also exerts a binding action on pigments.

Decolant (Sandoz).—This is a viscous liquid easily miscible with water. Added to ready-made printing pastes its function is to prevent coagulation and separation of the gum thickeners.

Diethylene Glycol and Ethylene Diamine

Diethylene Glycol (Gen. Met. and Chem. Co., Ltd.).—A product similar in many respects to ethylene glycol and used in the finishing trade to some extent. Principal application as a softener for vegetable and animal fibres (including rayon) but has specialised uses in twist setting.

Ethylene Diamine (Gen. Met. and Chem. Co., Ltd.).—Again, not an entirely new product, but one finding textile applications. Formula is $H_2NCH_2CH_2NH_2$. A water-soluble liquid with an ammoniacal odour. This organic base will be found less harmful to sensitive fibres than stronger inorganic alkalies. May be used to neutralise the acidity of oils.

Lanasan (Sandoz).—A light-coloured, neutral, hygroscopic powder soluble in water. A very good protective agent for animal fibres. Maintains wool strength, prevents shrinkage, felting and hardening, especially in scouring and dyeing where alkaline baths are used. Applicable in chrome dyeing but should not be used in wool chlorination.

Lyofix DE (Clayton Aniline).—This cation-active type of assistant is a paste, soluble in hot water and very stable to dilute acids and alkalies. Its main employment is in increasing the all-round fastness of direct dyeings, though it may increase the water-fastness of direct colour prints or discharge prints on direct colours.

Migasol PC (Clayton Aniline).—This is a highly stable emulsion with paraffin wax in a state of colloidal suspension. Its characteristics are insensitivity to acids, alkalies or saline solutions. Its use is universal in all those textile processes in which paraffin wax is used. Thus it is employed in sizing and filling, delustring and (with acetate of alumina) as a one-bath waterproofing agent.

Migasol PCS (Clayton Aniline).—A variant of Migasol PC, marketed as a white paste soluble in 6 times its own volume of hot water. Employment similar.

Modinal (Gardinol).—One of the latest products of this pioneer concern, Modinal is applied to the pre-cleansing of hosiery for the removal of oil and dirt. It assists penetration and levelling in the dyebath, its chief claim to interest being that it is possible to scour and dye in the one bath. It has good foaming qualities, softening action and fibre protection.

Mulsoid WS and RW (Mulsoid Co.).—WS is a slightly alkaline scouring agent for textiles sold in jelly form. It can replace soap in most textile processes with the advantages of comparative insensitivity to hardness, etc. Can be used as

a softening agent; for soaking silk; as a substitute for soluble oil in direct dyebaths. RW is similar to WS but has been adjusted to laundry conditions.

Perpentols E, S and BS (Hexoran).—These are the latest solvent preparations of this firm. The first is a kier-boiling assistant of the solvent type and is especially efficient for scouring rayon knitted goods. The second is developed for tar spotting on woollens and felts. The third is applied to the one-bath scouring of rayon hosiery.

Silvatal I (Clayton).—A non-inflammable stain remover with a solvent action on grease, fat, oil (vegetable or mineral). All types of fabrics.

Sulfatake (Rex Campbell).—This is perhaps the only example of a petroleum sulphonate functioning as do the sulphonated fatty alcohols. It is stable at high temperatures and can be used in scouring and dyeing. In scouring it aids penetration and facilitates soap removal. In dyeing it improves penetration and gives level effects. The calcium and magnesium salts being soluble, no lime soaps can form.

Solunaphthols (J. W. Leitch).—Water-soluble naphthols of the beta-hydroxynaphthoic acid type. In the form of fine powders easily soluble in warm water they give naphthol baths of standard pH values for the production of fast azoic colours on textiles when combined with diazotised bases or stable diazo salts.

Tergitols o8, 4 and 7 (Gen. Met. and Chem. Co., Ltd.).—Higher secondary alcohol sulphonates of the type RR'CHOSO₂Na. Wetting and penetrating agents for textile wet processes of every type where these qualities are of advantage. The 7 brand is recommended for dilute or nearly neutral liquors, and 4 brand for concentrated saline, acid or alkaline liquors, and the o8 brand for very concentrated or highly alkaline liquors such as are commonly used in mercerising.

Tests for Cl, Br and I

Presence of each Detected in Solution

A METHOD of testing for the presence of Cl, Br and I ions in any solution has been described by C. Duval and G. Mazars (*C.R. Acad. Sci.*, 207, 862). A silver ferrocyanide test paper is made by dipping a sheet of ordinary silver citrate photographic paper into an aqueous solution of potassium ferrocyanide (10 grams per litre) for five minutes. The paper is washed with distilled water and then with silver nitrate to remove any traces of the potassium ferrocyanide. Another washing in distilled water is followed by dipping the paper into a 10 per cent. iron sulphate solution. The paper is then allowed to dry without being rinsed, and is stored in a dark place away from air.

A drop of the liquid to be tested is allowed to fall on the paper and if the solution contains Cl, Br or I ions the paper will turn green, then blue. Wash, and the blue spot persists. The presence of fluorides, cyanides, sulphocyanides or ferrocyanides will not affect the reaction. Chlorates, bromates and iodates will produce the same reaction. If the solution contains a phosphomolybdenum ion, the paper will be tinted with molybdenum blue; thiosulphates also give a blue coloration, but both of these can be removed by washing the test paper in acetic acid. The method is said to be very sensitive.

Three tests are made to determine which of the three ions Br, Cl and I is present. For the first a drop of the solution under test is put on a square of silver citrate photographic paper and allowed to dry. Put the paper in a concentrated ammonia solution for 5 minutes, expose to light for one minute, and develop with hydroquinone. Bromides and iodides only will leave a black spot on a chamois coloured ground. A second piece of silver citrate paper, stained with a drop of solution, is developed in a concentrated solution of normal ammonia. Chlorides and bromides leave a black spot, iodides do not. A sheet of silver bromide paper, stained with a drop of solution and developed with hydroquinone, will show a white or grayish spot if the solution contains chlorides or iodides, but not if it contains bromides.

The New Water-Proofing Introduction of a Textile Principle with Far-Reaching Possibilities

By
A SPECIAL CORRESPONDENT

IN the popular view, the primary significance of the "Velanisation" process introduced last year by Imperial Chemical Industries lies in the fact that here for the first time we have a process whereby any fabric, whatever its nature or structure, can be rendered waterproof permanently, simply and economically. There is the deeper significance, however, that a revolutionary textile principle has been introduced and applied commercially with success in at least one field, that this field by no means exhausts the possibilities, and that other important developments may be expected to follow.

A clearer idea of the work actually accomplished by I.C.I. can be gained from a brief review of the methods previously utilised to render fabrics water-proof, and their shortcomings. These consist of:—

(a) Methods where fabrics were so impregnated as to block the interstices of the fabric, coating the whole with a water-repellent skin and making them impermeable to both air and moisture.

(b) Methods whereby the individual fibres composing the fabric were coated with a hydrophobic substance, allowing materials so treated to remain porous to air, but almost impervious to water owing to capillary (surface tension) effects.

Impregnating Materials Leaving the Material Porous to Air

The methods comprising (a) typified by so-called "rubber-proofing," have utility in particular fields, but for clothing materials may be condemned as unhygienic. Impregnating materials used or suggested, on the other hand, classed under (b) may be grouped as follows:—

(1) The first group is represented by aluminium compounds, chiefly aluminium acetate and formate, in the form of metallic soaps. In this class, also, may be placed alumina and the salts of the heavy metals dissolved in organic solvents or used as emulsions.

(2) The second group comprises such substances as tallow, soaps, oils, fats, waxes, etc., dissolved in organic solvents or used as emulsified soaps. Amongst other materials in this class are wool grease (lanoline), carnauba (Brazil) wax, ceresin (mineral wax), paraffin, cetyl palmitate and various synthetic wax-like substances. These are used in the form mentioned or in combination with metallic soaps. Resin and resin soaps have also been suggested, together with castor, wood, colza (rape seed), linseed and mineral oils.

(3) The third group comprises gelatine, isinglass, agar-agar and other vegetable or animal proteins.

(4) The fourth group, on which a large patent literature exists, comprises certain sulphonated fatty acids, mineral oils and emulsifiers; also gelatine, agar-agar and other vegetable or animal albuminous substances in conjunction with fatty alcohol sulphonates which act as emulsifiers.

(5) The fifth class consists of cellulose derivatives such as cellulose ethers of the methylcellulose type, and water-soluble polymers (vinyl compounds). These are produced as aqueous emulsions and, after evaporation of the water, tenacious elastic coatings are said to remain, these being insoluble in water without further treatment.

The principal method in use at one time for impregnating fabrics porously was that in which aluminium soaps were precipitated on the fibres of the fabric. Apart from the impermanency of the finish, the chief disadvantage of the process was that it was a two-bath process. The proper effect, moreover, could only be obtained by persons of great experience, the feel of the goods suffered, lime-soap formation could lead to faulty dyeing, and there was more often than not the necessity of frequent repetition, so that instead of a two-

bath process, a three and even a four-bath process was necessary.

Certain alternative methods proved even less satisfactory. The application of waxes dissolved in organic solvents was dangerous owing to the inflammable nature of the latter, while the use of a solvent recovery apparatus was necessary, and fabrics treated by this method were frequently air-proofed to a considerable extent. Methods involving the application of paraffin wax, either rubbed or sprayed into the goods, which were subsequently calendered, had a short life owing to the fact that the pores of the fabrics had a tendency to fill up.

Most success before the advent of the "Velanisation" process accrued to a one-bath process whereby each fibre was coated with a thin film of wax, the improved effect itself being due to development in the technique of producing really stable emulsions. The complete coating of the fibres with the thin, uniform film necessary for water-repellancy was thus facilitated, but the question of permanency remained. Wear, washing and dry-cleaning had their inevitable effect.

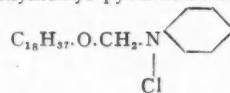
It is understandable, therefore, that efforts should be made either to anchor the hydrophobic film firmly and permanently to the fibre surface, or to make it part of the surface, i.e., to make the surface itself hydrophobic. Efforts along the first lines led to the I.G. finish dealt with later; efforts along the second, with which we are primarily concerned here, resulted in the "Velanisation" process, success being attained by a complete chemical transformation of the fibre surface. In the process, the Velan compound, applied to the goods in aqueous solution or dispersion, on later treatment (drying and heating) of the goods combines with the cellulose or protein molecule of the textile fibre to form a true chemical compound with the fibre itself. And that compound is hydrophobic.

Only one chemical substance is used, i.e., a quaternary pyridinium salt. Ordinarily, these are used to improve the fastness of dyeings on cellulose, but experiment showed that the compound is unstable to heat. Baking for a limited period brings about the unexpected property that the fibre becomes water-repellant. The finish is remarkably permanent to washing and dry-cleaning, while at the same time the handle of the goods is softer and fuller.

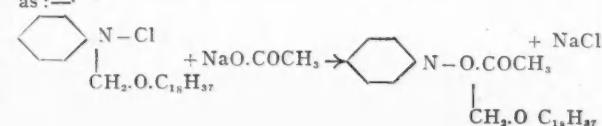
Preparation and Mode of Action of Quaternary Pyridinium Salts

The compounds acting in this way are quaternary pyridinium salts where one substituent group is a fatty radicle, linked to nitrogen through an oxygen atom. A halogenated ether of a fatty alcohol is the first stage in the manufacturing process. Dry hydrogen chloride passed into a mixture of octadecyl alcohol formaldehyde dissolved in benzene ultimately results in the halogenated ether:— $C_{18}H_{37}\cdot O\cdot CH_2\cdot Cl$.

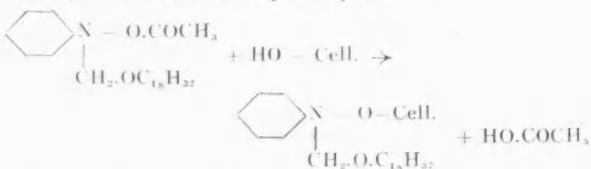
When this is brought into contact with a tertiary amine or pyridine, addition occurs and the formula of the product, octadecyl oxymethyl pyridinium chloride, is probably:—



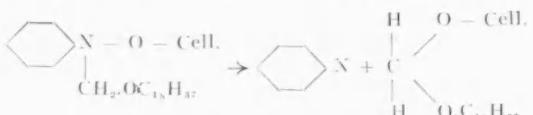
This is Velan PF, and is applied to the fabric in the presence of an acid neutralising agent such as sodium acetate. In aqueous solution the reaction has been given by Dr. Mullin as:—



On drying cellulosic material impregnated in the above acetate, the reaction would probably be :—



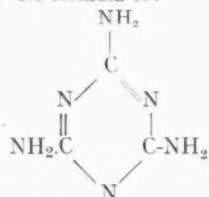
Then when the cellulose compound is baked, pyridine is split off, and the water-repellent effect obtained :—



It should be noted that although the reactions suggested above apply to cellulosic fibres (cotton, linen, rayon, etc.) those with animal fibres (wool and silk) may be different, although the final result will be practically analogous.

Mention must be made, finally, of a successfully obtained permanent water-proof finish emanating from Germany (IG Farbenindustrie). Here it was the idea of anchoring a separate hydrophobic film firmly to the fibre surface that was fol-

lowed up. By this method, cellulose is treated with a mixture of a fatty amine, formaldehyde and a basic substance such as melamine—formed from cyanamide, N:C.NH_2 , by heating to 150°C . Its formula is :



When heated with formaldehyde it forms a resin, like urea, but with this difference, that melamine does not require the aid of an acid catalyst. The fatty amine is obtained from the corresponding alcohol by treatment with phosphorus and bromine to give, with cetyl alcohol, cetyl bromide, or with stearyl alcohol, stearyl bromide. On reacting these halides with ammonia the amine is formed :—



A liquor consisting of melamine, stearylamine and aqueous formaldehyde is then made up and cotton piecegoods treated in it for 15 minutes. After centrifuging and drying at 100°C . for an hour the goods acquire a water-repellent finish resistant to boiling soap solution.

The New Synthetic Textiles A System of Classification—Their Relation to Wool

WHEN I inform you that no less than 164 varieties of new synthetic textiles have recently been registered in Germany alone, you will appreciate my statement that the production of synthetic textiles designed to imitate wool and other natural fibres is one of the most important commercial developments of modern times." These were the opening remarks made by Dr. H. A. Thomas in a lecture to a joint meeting of the Manchester Section of the Society of Dyers and Colourists and the Society of Chemical Industry, presided over by Mr. S. Heap, on January 20. Dr. Thomas stated that one important factor which had inspired scientific effort in this direction was the urge of the totalitarian states to become independent of imported raw materials.

Much confusion had been caused by the numerous trade names of new fibres on the market, especially by reason of the fact that descriptive names could not be registered. Dr. Thomas outlined the following classification which he had compiled as the result of investigations on dyeing and textile properties of the new fibres, in the dyehouse laboratories of I.C.I. (Dyestuffs Group) :—

Class 1. All protein fibres.

- e.g. Lanital (A.C.N.A. and S.N.I.A. Viscosa, Italy).
- Lactofil (A.K.U., Holland).
- Casein Fibre (Courtaulds, England).
- Tiolan (I.G., Germany).

These fibres were produced from milk casein, by extrusion of an alkaline solution into an acid coagulating bath, also containing metal salts such as aluminium or zinc sulphate and/or silicates.

Soya bean silk (Shrawa Industry, Japan).

Class 2. Fibres of regenerated cellulose containing protein.

- e.g. Cisalpa (Italian manufacture).
- Fibramine (Fabelta S.A., Brussels).
- Lacisana (S.N.I.A., Viscosa, Italy).

These fibres were produced by extruding viscose dope containing casein, into an acid coagulating bath.

Class 3. Animalised or basified viscose rayon.

- e.g. "Rayolanda" (Courtaulds, England).
- Artilana (Artilana, Komm.Ges., Schlutius & Co., Germany).
- Vistralan (I.G., Germany).

The production of these fibres which possessed wool dye-

ing properties in varying degrees, involved the use of synthetic resins. Either the synthetic resins or their components were incorporated in the viscose spinning mass, or the preformed filaments were treated with the resin components followed by formation of the resin *in situ*.

Class 4. Synthetic resin fibres.

- e.g. Nylon (E.I. Du Pont de Nemours & Co., U.S.A.).
- Vinyarn or Vynylon (Carbon & Carbide Chemicals Corporation, Ltd., U.S.A.).

It was stated that Nylon possessed remarkable tensile and elastic properties, and also a good resistance to hot alkali or soap liquors. These fibres were produced either by extrusion of a solution of the resin in a low-boiling organic solvent into hot air or by extending a plastic mass of the resin.

Class 5. Physically modified viscose staple fibre.

This class included viscose staple fibre cut to staple lengths suitable for admixture with wool, e.g., "Fibro" (Courtaulds, England) to form a wool—"Fibro" union yarn or fabric, and also viscose staple fibre specially crimped or curled, e.g. Vistra XT (I.G. Germany), to facilitate blending with wool. Lanusa was a dull lustre viscose stable fibre, produced by spinning into water instead of into sulphuric acid solution.

Dr. Thomas then enumerated the various outlets which the new fibres were finding. Very few 100 per cent. synthetic fibre fabrics had been encountered, the main application of the new fibres being in admixture with natural fibres such as wool or cotton to produce novel fabrics and novel colouring effects.

Methods of characterisation and analysis were then described as a necessary preliminary to dyeing, and details of dyeing methods suitable for producing solid or contrasting shades on yarn or fabrics containing the synthetic textiles together with wool, or cotton, were then given. It was explained that these methods had been devised by Imperial Chemical Industries, Ltd. (Dyestuffs Group).

In conclusion, Dr. Thomas pointed out that the new synthetic textiles could not be regarded as substitutes for wool, but as supplementary to wool, for the production of novel and cheaper fabrics and novel effects. They were indeed new media of expression for the textile designer. Their introduction rendered the services of qualified chemists even more indispensable in the textile dyeing and finishing trade.

Safety Glass Patent Action

Hearing of Claim for Damages Continued

THE action in which damages are claimed by a Midland firm for alleged breach of contract and conspiracy concerning a safety glass patent was continued in the King's Bench Division this week.

Plaintiffs were the Gilt Edge Safety Glass, Ltd., of Stone, Staffordshire. Defendants, who denied the allegations, were Mr. Granville Hugh Baillee, a consulting engineer, of Westminster; Pilkington Brothers, Ltd., of St. Helens; Triplex (Northern), Ltd., of St. Helens; Mr. James Meikle, manager of Pilkingtons' works; Mr. Robert Francis Taylor, who is also employed by Messrs. Pilkington; Mr. Lewis Jex-Blake Forbes, manager of Triplex (Northern), Ltd., and Mr. John Dennet, of Pilkington Bros. (Australia), Ltd.

Plaintiffs alleged that in 1935 they desired to operate a process in regard to the manufacture of "toughened" safety glass. In order to ascertain that their process did not infringe any of the patents of Pilkington Brothers, it was decided there should be a confidential inspection by Pilkingtons. This took place, and plaintiffs now alleged that Pilkingtons circulated information about the process to rivals and it found its way into the patent specifications of Pilkingtons.

Summary of the Plaintiffs' Case

Mr. Raymond Evershed, K.C., for plaintiffs, alleged that there were two breaches of contract by defendants—the breach which arose at the inspection of the process, and the breach which occurred as to disclosure. There was a combination of persons who committed or procured those breaches. The evidence against the individuals was somewhat different. He submitted that the plaintiffs had established that Messrs. Baillee, Forbes, Taylor, Meikle and indeed Mr. Dennett were parties to it. The evidence against Mr. Dennett was slight. It was really no more than that he was at the inspection. But, if individuals were parties to breaches, then the principals were bound by the acts of their agents. Mr. Evershed emphasised there was no allegation of conspiracy to defraud by defendant. That case had never been opened or pursued. Plaintiffs felt, however, that the breaches of contract by defendants were not fair dealing.

Submission by Defendants' Counsel

Mr. Norman Birkett, K.C., submitted that no case had been made out by plaintiffs against defendants or any of them, and there should be judgment for defendants on all matters alleged in the case. The essence and crux of the action was whether it had been established by plaintiffs that Pilkingtons took anything whatever from the inspection of June 3, 1935. There was nothing in the evidence which showed they did, and therefore they should succeed. Dealing with the suggestions of fraud against defendants, Mr. Birkett said they felt strongly about the matter. The charges were put into the statement of claim, and there was no evidence before the Court to support them. He intended to rely upon his submission that no case had been made out by the plaintiffs. He did not propose to tender any evidence. He denied there was any breach of contract by Pilkingtons or any of the other defendants. By what was known as the Wilson experiments defendants, in 1931, reached the same stage as plaintiffs reached in 1934, with regard to toughened glass and the method of cooling. Mr. Birkett referred to experiments carried out on behalf of Pilkingtons for the manufacture of toughened safety glass. These, he said, were known as the Forbes-Dennett tests, Meikle-Harper tests and the Wilson experiments. They were carried out before the inspection of plaintiffs' process. It could not be said, after the inspection, that Pilkingtons added anything to their specification. They possessed the method already. He submitted there was no breach of contract as contended by plaintiffs—the alleged

(Continued at foot of next column.)

New Textile Finishing Agent

A Water-Soluble Cellulose Derivative Designed to Replace Starches, Dextrins and Natural Gums

AN improved textile finishing agent, Cellofas WLD, put on the market by Imperial Chemical Industries, Ltd., is a water-soluble cellulose derivative sold in the form of white flocks. It is uniform in composition and when dissolved in water forms viscous solutions which, apart from a few undissolved fibres, resemble those obtained from natural gums. These solutions are neutral and are extremely resistant to the action of light, alkalies, and atmospheric oxidation. They do not ferment or become acid on standing. Cellofas WLD is soluble in cold water up to temperatures of approximately 30° C., but is insoluble in hot water.

Although finishes obtained by its use resist washing better than corresponding starch or natural gum finishes, it should not be regarded as a "permanent" finishing agent. The binding properties of Cellofas WLD are much superior to those of starch and the product can carry a much greater proportion of filler than can be applied satisfactorily to yarns or fabrics from a starch mix. Because of its ability to form viscous colloidal solutions it acts as a very efficient protective colloid. This property makes it particularly valuable when used in conjunction with the ordinary finishing agents of the starch type, since its inclusion in the mix slows down the separation of fillers, etc., and at the same time improves the finish.

When used alone it gives a full, supple handle to yarns or fabrics and a finish that is tough and resistant to friction. It may be applied in any ordinary textile machine, such as a padding mangle or back filling machine, and only requires can or stenter drying and any of the usual mechanical finishing processes after application.

Cotton or rayon yarns may be sized by the application of a 1-2 per cent. solution of Cellofas WLD, when a full but tough and supple sizing effect is obtained. For finishing cotton, linen, or rayon piece goods, it may be used with advantage in solutions of ½-5 per cent. concentration according to the stiffness desired. For loaded finishes, it has definite advantages over starch and dextrin owing to its high suspending action on fillers such as china clay and its ability to anchor them on to the fabric and reduce dusting problems.

Where lustre is required, a dilute solution of Cellofas WLD (about ¼ per cent.) may be used on the dewing or damping machine before calendering. The tendency to slippage of warp threads over weft in loosely woven rayon fabric is markedly reduced by its use. The fabrics are padded at room temperature in solutions containing ½-1 per cent. Cellofas WLD and then dried in the usual manner without rinsing off.

(Continued from previous column.)

use in Pilkingtons' complete specification of something seen, or some information gained, at the inspection of June 3, 1935. What went into the specification was not derived from that inspection.

As to the non-disclosure by Pilkingtons to plaintiffs of their specification, the case made by the Gilt Edge Co. was that Pilkingtons were under some contractual obligation to disclose the specification. The answer to that was in the language of the letters, which were clear and precise. To try to enlarge what was in the correspondence to something that was to be disclosed which might be thought to have a connection—remote or otherwise—with the provisional process would not bear examination. The conspiracy alleged was that Messrs. Baillee, Meikle, Forbes and Dennett conspired together to procure a breach of contract by Pilkingtons. That was an impossible contention. There was no evidence before the Court that any of the defendants who were charged with conspiracy to obtain the breaking of a contract knew that there was such a contract in existence.

Mr. Justice Branson reserved judgment.

New Manesty Water Still

High Quality Distilled Water Produced at Low Cost

A NEW Manesty water still (the "OA" model) electrically and gas heated, has been designed by Manesty Machines, Ltd., to produce high quality distilled water at low cost. The new models are fitted with pyrex glass lids and pyrex glass triple vapour baffles, and their operation is similar to that of the other Manesty stills. In the new models the inlet water enters at the bottom of the condenser, circulates round the heavily tinned copper condenser tube, fills the boiling chamber to a fixed level, and overflows to waste. The steam condensing preheats the raw water before it enters the boiling chamber and dissolved gases such as ammonia, carbon dioxide and oxygen escape to atmosphere and are not re-dissolved in the distilled water. The glass triple vapour baffle prevents contamination of the distilled water by splashing or frothing in the boiling chamber. The steam changes direction three times before reaching the condenser tubes. The level of the water in the boiling chamber is controlled by a new type of automatic feed water control which can be easily detached from the still for cleaning purposes.

Special models of the Manesty "OA" still are supplied for operation in hard water districts where deposits quickly form in the boiling chambers of stills and necessitate frequent cleaning. These "OA" stills are fitted with a deconcentrator which prevents to a large extent the concentration of the raw water in the boiling chamber and prevents the deposition of solids. The Manesty "OA" electrically heated still is fitted with an immersion heating element of a particularly robust type. The consumption of this element is 1,500 watts. A safety cut-out device is fitted so that should the water supply to the still fail, no damage is done.

The output of the "OA" still, gas or electrically heated, is 3 pints distilled water per hour. When gas at 7.4d. per therm is used the cost of the distilled water is 1.31d. per gallon, while with electricity at 1d. per unit the cost per gallon is 1.1d.



Manesty "OA" still, electrically heated type.

New Type Urea-Formaldehyde Resin

Use in Embedding

THE application of a new plastic material developed by the I. G. Farbenindustrie for embedding articles is described by Ball (*British Plastics*, 10, 351-352). The new material, which has been produced at the Oppau laboratories of the I.G., is known as "Einbettmasse HFK." It is a colourless urea-formaldehyde resin having the consistency of honey. In order to cause it to set, it is necessary to add a coagulating agent (composition unstated), which, in the course of a few hours, transforms the whole mass to a solid of rubber-like consistency, still quite transparent.

The object that it is desired to embed is laid in a basin half lined with the plastic, and then more of the material poured on top, the coagulating agent having already been added. Plants must have their stems protected by glass tubes, to prevent them being bent by the flow of material around them. Also air must be removed from the objects, which necessitates that many be treated in a vacuum. It has been found possible to embed dry plants, beetles, anatomical specimens, etc., without preparation. As the plastic is slightly acid, some natural colours in plants are destroyed in course of time. Chemicals may be added to prevent the loss of colour in some cases, as for instance, the chlorophyll in the leaves of plants.

Deterioration of Fat in Foods

Factors Affecting the Development of Oxidative Rancidity

DETERIORATION of fat in foods was the subject of a paper read by Dr. C. H. Lea, of the Low Temperature Research Station, Cambridge, to a joint meeting of the Food Group and the Liverpool section of the Society of Chemical Industry, held in the University of Liverpool and presided over by Mr. B. D. W. Luff. Dr. Lea mentioned the general symptoms of oxidative rancidity, the variety of products affected, and the conditions of storage under which it could develop, included in the latter being the cases of dried and frozen foods which are not susceptible to microbial spoilage.

Factors affecting the development of oxidative rancidity could be divided into two classes, comprising (a) internal factors, which might be regarded as inherent properties or constituents of the natural raw material and (b) external factors such as temperature, light, contamination with metals, access of oxygen, etc., which were of importance chiefly in processing, packing or storing the natural raw materials. The factors of group (a), to which the main part of the lecture was devoted, had been very little investigated. They comprise (I) the reactivity of the fatty glycerides themselves towards oxygen, (II) the protective or retarding action of natural antioxidants or inhibitors, and (III) the harmful or accelerating effect of natural pro-oxidants or oxidising enzymes.

The avidity with which the glycerides combined with oxygen increased rapidly with increasing unsaturation, and in case of animal milk and body fats unsaturation was influenced to some considerable extent by nutritional factors.

Traces of Antioxidants in Natural Fats

Natural fats and oils were accompanied in the tissues by traces of substances which function as antioxidants and which were of the greatest importance in determining keeping properties. Highly active concentrates had been prepared from various vegetable oils and oil-bearing seeds, and the vitamin-E-active substances of wheat germ and cottonseed oils were powerful antioxidants. Nothing was yet known concerning the nature or origin of the antioxidants present in animal fats, although there was a suggestion that inhibiting substances from the food might pass over into the milk and body fats.

Evidence for the existence of enzymes which accelerated the development of rancidity was discussed and illustrated by data.

In the course of the discussion, the question was raised as to the action on fat of salt and preservatives. Salt was sometimes regarded as a preservative. The interesting fact emerged that while a small quantity of salt produced changes, a large quantity did not. Dr. Lea remarked that salt sometimes acted as an accelerator of changes.

PHOTO-CHEMICAL RESEARCH

Professor J. C. Ghosh, Head of the Department of Chemistry, Dacca University, India, and his collaborators have recently observed that under certain circumstances anisotropic structure may be produced in amicroscopic sol particles of tungstic acid, vanadic acid, chromic tungstate and ceric borate sols if during the coalition of the molecules to form the sol particles, they are exposed to circularly polarised light. It has also been observed that the velocity of a photochemical reaction with one of the above sols as photosensitiser depends on the nature of the circularly polarised light used for maturing the sol and subsequent irradiation of the reaction mixture. Sol matured in dextro light gave different velocities of reaction for the same intensities of dextro or laevo light used for irradiation and thus bringing about a photo-chemical transformation. Similar results have also been obtained with sols matured in laevo light.

A Multiple Test Machine

New Instrument Designed for Measuring Viscosity, Plasticity and Hardness

AN interesting new machine, which can be transformed by slight changes or additions for measurements of viscosity, plasticity or hardness has been developed by Brabender, Duisburg, Germany. The portion of the instrument which remains permanently connected together and which is used for all tests consists of a motor, connected by a system of levers to a scale and to a graph mechanism by which the variations are recorded.

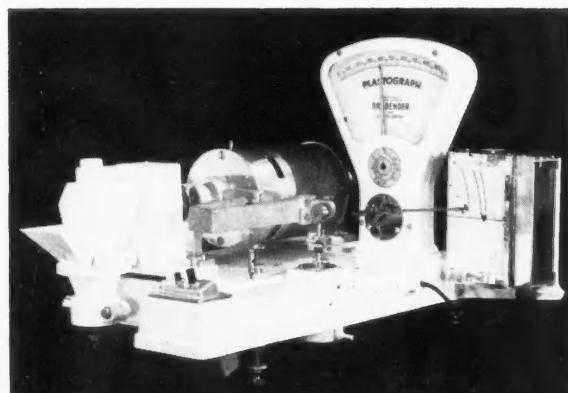
Mechanical System of Operation

The motor (2) is of rather special construction, the rotor running freely in ball bearings (3). The stator is not fixed to a base, but can turn around the shaft of the rotor, ordinary bearings being provided between the stator and the rotor shaft so that normally when the motor turns, the friction in these bearings will tend to cause the stator to revolve also. The revolution of the stator is prevented by the lever system (4) which is fixed firmly to the stator. The torque given to the stator by the friction of the bearings causes the lever system to transmit to the scale (6) a direct reading of the amount of the torque in grams. In order to prevent oscillations through vibration or other causes, an oil damper (5) is connected to the lever system.

For continuous viscosity tests, a hermetically closed mixing case (1) is connected to the shaft of the motor, which causes a small paddle wheel inside the case to revolve, the resistance of the substance under test influencing the torque transmitted by the rotor to the stator. The substance to be tested enters the mixing case from below by a tube (10) which is connected to the circulation pipes of the factory, and draws samples direct. Another tube (9) at the top of the mixing case returns the liquid to the circulation pipes. Where temperature variations may cause changes in the viscosity, a special thermostat apparatus (8) which consists of a case containing heating coils, thermostatically controlled, is employed. The coils keep a tank filled with

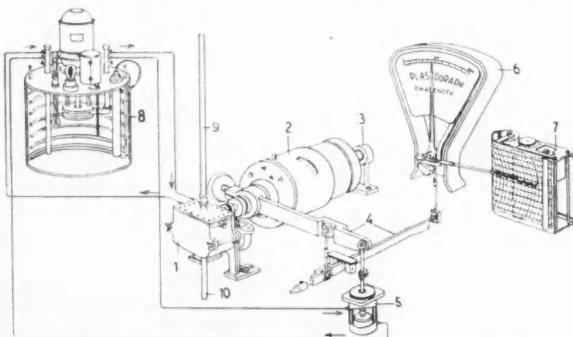
static arrangement, like that used for viscosity tests, can be used if desired.

For measurements of hardness a completely different additional apparatus is used in the place of the mixing case. It consists of a pre-crusher which granulates the substance to be tested, and a crusher, which makes the actual test. As the material leaves the pre-crusher (which is operated by a



General view of the machine as used for hardness testing of granular substances

small motor), it falls down two tubes into the crusher, where, when a suitable quantity of material has collected, the test can be made. The crusher is driven by the main motor (2), and when the material collected is ground up its resistance to grinding affects the torque transmitted to the scale just as in the viscosity and plasticity tests. If the material to be tested is already in granular form, no pre-crusher is required, and the material can be introduced directly into the crusher.



A diagram showing the working of the Brabender machine assembled for continuous viscosity tests.

water at a constant temperature, and by means of a small motor which forces the water to circulate through the double walls of the mixing case, keeps the contents of the latter at constant temperature as well.

Tests of plasticity are made with a mixing case similar to that used for viscosity tests, but unlike the former the case has no pipes leading to or from it, and is left open at the top. A pipette permits the amount of liquid mixed with the mass under test to be increased so that its plasticity at various percentages of moisture content can be determined. The mass is mixed by the revolving paddle wheel in the mixing case, and affects the machine exactly in the same way as the viscosity of the liquid in the first case. A thermo-

Determination of Sodium in Feldspar

New Method Based on Zinc Uranyl Acetate

AMETHOD for the determination of sodium in feldspar by means of zinc uranyl acetate has been perfected by Koenig (*J. Amer. Ceram. Soc.*, 1939, 22, 1, 24-31). The sample to be analysed, ground to pass a 200 mesh sieve, is dried at 150° C., and then 0.1 gm of it weighed into a platinum dish, moistened with 0.5 cc. HClO_4 and 10 ccs. of HF, and the mixture evaporated until almost all the fumes of HClO_4 have been driven off. The mixture is cooled, a few ccs. of water are added, and the temperature raised to allow dissolution. Then the volume is adjusted to 5 ccs., and 20 ccs. of a solution of zinc uranyl acetate added (made by mixing 10 gms uranyl acetate in 49 gms. of water with 30 gms. zinc acetate in 32 gms. water). The temperature of the mixture is maintained at 22° C. in a thermostat for 30 minutes. The precipitate is filtered off on a fritted filter and washed several times with 95 per cent. alcohol saturated with zinc uranyl acetate. Drying of the precipitate may be effected either by washing with ether and drawing air through, or by heating at 80° C.

The advantage of the method over the existing one is that it can be used when all the commonly occurring metals are present—Al, Fe, Ti, Ca, Ba, K, so that lengthy separation procedures are unnecessary if the sodium content alone is required. If, however, potassium also is wanted, the method presents no advantages.

National Service

Reserved Occupations in the Chemical and Allied Industries

THE following are among the occupations listed in the Government's Schedule of Reserved Occupations (Provisional) in respect of which, in general national interests, restrictions will be placed in peace-time on the acceptance of volunteers for certain forms of enlistment or enrolment for service in time of war (ages given in parentheses indicate that restrictions in that occupation apply only to volunteers of or above that age; if no age is given the restriction applies to volunteers whatever their age):—

Cement, plaster, lime and artificial building materials manufacture: all workers in productive processes other than labourers (30).

Chemicals, drugs: all workers in productive processes other than labourers in the manufacture of chemicals and galenicals, including drugs; artificial manure and non-nitrogenous fertiliser manufacture (30).

Chemist: chemist (analytical, research, etc.), excluding pharmacist (21).

Coke oven by product plant worker: all workers in productive processes other than labourers (25).

Coke oven workers: all workers in productive processes other than labourers (25).

Explosives manufacture and filling: all workers in productive processes other than labourers in gunpowder, gun-cotton, explosives manufacture; small arms ammunition and fireworks manufacture, explosive filling (excluding examiner); examiner (small arms, arms, ammunition, etc.) (25).

Gas works: all workers in productive processes other than labourers (25).

Grease, glycerine manufacture: all workers in productive processes other than labourers (30).

Ink manufacture: all workers in productive processes other than labourers (30).

Laboratory assistant: laboratory assistant, skilled (—).

Paint, colour, varnish and cellulose lacquer manufacture: all workers in productive processes other than labourers (30).

Patent fuel manufacture: all workers in productive processes other than labourers (25).

Physicist: physicist (25).

Scientific, mathematical, optical, electrical, surgical, dental instrument apparatus, and appliance maker, assembler: physical and chemical apparatus maker (21).

Tar distillation, low temperature carbonisation and hydrogenation plant worker: all workers in productive processes other than labourers (25).

Letters to the Editor

Protection of Trade Marks in the Straits Settlements

SIR.—We beg to inform you that an Ordinance for the Registration of Trade Marks in the Colony of the Straits Settlements has recently been passed and it is expected that the same will come into operation on February 1, 1939. The position hitherto has been that this Colony has had no Trade Mark Law and when the Ordinance comes into force it will therefore be possible, for the first time, to register Trade Marks in this Colony.

Part II of the Ordinance provides for the validation or extension to the Straits Settlements of Trade Marks which are registered in the United Kingdom subject to the necessary Application in the Straits Settlements being made within six months from the date of commencement of the Ordinance. We are advised that the privileges and rights granted under Part II of this Ordinance by virtue of such Registration in the Straits Settlements will date from the date of Registration in the United Kingdom.—Yours faithfully,

Staple House,

51-52 Chancery Lane,
W.C.2.

GEE AND CO.

RECENT TRADE LITERATURE

WARREN, WEBSTER AND CO., LTD., has issued a new catalogue, now available to those interested, on Webster systems of steam heating and Webster steam equipment. Items of particular interest to the chemical industry are those dealing with thermostatic steam traps, low pressure steam traps, low pressure traps, process steam traps and pressure reducing valves. These devices, which are produced in a variety of types, are described and illustrated in an excellent manner, and in addition details are given of dimensions and rated capacities. It is interesting to note that the company's process steam traps are now constructed throughout in Monel metal and stainless steel, thus assuring long life and trouble-free operation. It is claimed that all Webster steam traps overcome the difficulty of air locks in steam-using apparatus.

What exactly is metallic wear? Can it be defined or is it made up of too many factors to admit of a simple definition? In Technical Bulletin No. 112 issued by E. G. ACHESON, LTD., an attempt is made to answer these questions; at any rate, where it concerns new bearing faces. This publication discusses experimental facts on wear and the light which they throw on the mechanism of the process. Having been associated with much of the research work described in the publication, the company have correlated their own work on surface phenomena during lubrication employing colloidal graphite with the broader aspects of wear. Test results and curves are quoted to show how colloidal graphite reduces wear and enables an engine, for example, to realise nearly its full designed power output on the bench during the preliminary running-in. The wide interest of the bulletin may be gathered from the fact that it is now the practice to assemble and run-in with colloidal graphite in oil engines of all types, reduction gears, tractor equipment, machine tools, pneumatic equipment, compressors and small mechanisms such as magnetos, meters and recording instruments.

The third edition of "Galvane and A.C.P. Rodines," a booklet published by IMPERIAL CHEMICAL INDUSTRIES, LTD., combines the latest information on the use of the well-known I.C.I. range of restrainers for acid pickling, with a practical and simply written account of the theory and practice of pickling generally, and the part played by restrainers in particular. The products which it describes show the extent to which pickling processes have been rationalised since the days when scale removal from metals merely consisted in immersing in an acid bath and hoping for the best. Acid pickling has now fallen into line with other branches of metal finishing, and the empirical use of substances of varying restraining efficiency—such as bran, middlings and glue size—has given place to that of standardised chemicals, scientifically designed for the purpose, and used in an accurately controlled process. Some figures in the introductory sections give a clear indication of how much good metal, let alone acid, may be wasted by arbitrary methods of descaling. In addition, there are discussed the secondary effects of acid brittleness and blistering of sheet and strip due to excessive evolution of hydrogen, the roughening and pitting of steel with consequent loss of tensile strength, and the damage to factory fabric caused by acid spraying. All these facts point to the need for a reliable method of controlling acid pickling so that metal and acid consumption are reduced without slowing up the descaling process. The latter half of the book deals in practical detail with specific restrainers and their use. Each restrainer in the I.C.I. range—consisting of Galvane, and the A.C.P. Rodines 40, 106 and 110—has been designed for a specific purpose, such as for the use with sulphuric, hydrochloric or nitric acids, or for pickling at low or high temperatures. Some of them are powders and some liquids, and both foaming and non-foaming types are represented. Complete dosage figures for these restrainers, covering a wide range of pickling baths are given. Tables of comparative temperature and hydrometer scales complete a useful combined handbook and works manual.

New Technical Books

UNIT PROCESSES IN ORGANIC SYNTHESIS. P. H. Groggins, editor-in-chief. Second edition. Pp. 769. London: McGraw-Hill Publishing Co. 36s.

Organic synthesis has now become an important field of activity for chemists in industry, and this book presents principles and practice of the more important and well-defined organic synthesis reactions in a systematic manner. Attention is directed not only to the chemistry and products of reaction, but equally to those contributing factors and agencies which lead to efficient operation. The processes dealt with are nitration, amination by reduction, diazotisation and coupling, halogenation, sulphonation, amination by ammonolysis, oxidation, hydrogenation, alkylation, esterification, hydrolysis, polymerisation, and the Friedel and Crafts reaction. Each section in turn is written by one of a number of specialists, whose name appears only at the chapter heading, the editor-in-chief being responsible wholly or jointly for six of the thirteen chapters.

Unit operations and unit processes are distinct and in the preface to the first edition it was shown how they are intimately related in the solution of chemical engineering problems so far as organic synthesis is concerned. The general plan of the present edition by comparison with that published in 1935 remains unchanged, but every chapter has been fully revised and brought into line with current developments, both technical and patent literature having been consulted. The chapters on alkylation and polymerisation have been substantially enlarged, and it is to be noted that the chapter on diazotisation now includes "coupling." The editor-in-chief makes special mention that there is increased emphasis on the importance of the synthesis of aliphatic compounds, and that there are new sections to explain the theoretical basis of halogenation and hydrogenation reactions by means of thermodynamics. Throughout the book there are line drawings of plant assemblies, flow sheets and graphs. Footnote references to the literature are numerous and provide a useful feature. That there is a demand for the type of information which is included is evident from the fact that the synthetic organic chemical industry has made the most remarkable progress in all manufacturing countries during the past ten years. In the United States, as an example, production has more than trebled since 1929, and there are indications that this development will continue at the same, if not a greater, rate during the next ten years.

LIBRARY GUIDE FOR THE CHEMIST. By Byron A. Soule. Pp. 302. London: McGraw-Hill Publishing Co. 15s.

The dedication to this book is taken from Richard de Bury's "Philobiblon," published in 1474, which states that books "are the masters who instruct us, without rods and ferules, without hard word and anger." The author has become convinced of the value of certain training in library technique for those who frequently need to consult the literature of chemistry. He points out that the location of chemical information is not an easy matter and success depends upon knowing where to look and what to seek. Critical judgment is also essential, because the finding of a statement in print is not a guarantee of its validity. This book has therefore been written primarily as a guide to the use of keys and summaries. The author starts with the arrangement of a library and its directories, neglecting true librarian problems in order to emphasise those which are of direct concern to the chemist in search of information. This is followed by a section upon sources of biographical data and a discussion of periodicals that are available and the manner of reading original reports. Abstract journals, reviews and annual reports, and encyclopaedias and dictionaries are dealt with in turn, followed by material which may be gathered from textbooks, patent literature and government publications. No attempt has been made to prepare a complete list of sources of information, nor to mention the "best books" only in any division. The author has endeavoured mainly to indicate

the great variety of reference material which is available, and, incidentally, so help the searcher after information to develop his own powers of searching. The closing chapter covers the subject of the writing of reports and the filing of notes; library arrangement and the construction of its card catalogues are given in the first two chapters. Between these two points there will be found much useful information for direct reference and much material for thought. Included under the heading of patent searches there is a useful tabulation of patent-finding aids, giving name of publication, countries included, date of commencement, and information upon method of presentation, together with some references to literature covering patents for particular subject matter, such as acetaldehyde, activated carbon and synthesis of phenol. Previous to the appearance of the present book, knowledge upon the searching of chemical literature had to be obtained mainly from Crane and Patterson's "Literature of Chemistry" and Mellon's "Chemical Publications."

HANDBOOK OF CHEMICAL MICROSCOPY. By Emile Monnin Chamot and Clyde Walter Mason. Second edition. Vol. I. Pp. 478. New York: John Wiley & Sons. London: Chapman & Hall. 22s. 6d.

This volume, of what is the only handbook wholly devoted to chemical microscopy, deals with the principles and use of microscopes and their accessories, and with physical methods for the study of chemical problems. Vol. II, for which a second edition will appear in due course, deals with chemical methods and inorganic qualitative analysis. The joint authors are professors at Cornell University, where a special study of chemical microscopy has been continued for many years and has been included as a course of study in elementary and advanced status. Although the subject has only made great progress in recent years it is by no means of recent origin, for "Elementary Chemical Microscopy" was written jointly by the authors of the present volume in 1914, and the educational features of the subject and its great value in the training of chemists were fully discussed ten years ago in the *Journal of Chemical Education* (1928, 5, 9, 258, 536).

The present edition of Vol. I of the book under review has been considerably expanded and now includes many important references indicating the trend of microscopical advances up to July, 1938, more particularly in the study of crystals and crypto-crystalline aggregates, fibrous materials, particle size, illumination and photomicrography, and preparation techniques. It is stated that the optical principles of microscopy and crystal study do not change in any marked degree from year to year, but there is now a much more intensive and precise utilisation of these principles which is yielding new contributions to progress in both scientific and technological aspects. Information on methods for the preparation of materials for microscopical study is given in chapter 5. Ultra-microscopy receives exclusive attention in another chapter. Special methods for the interpretation of appearances and observation of physical properties, the study of doubly refracting materials by means of the polarising microscope, the preparation of crystals for study, the determination of the refractive indices of liquids and solids, particle size measurement, and the quantitative analyses of heterogeneous mixtures, each receive attention in turn. Numerous illustrations of equipment and in explanation of optical principles are included. There is also an appendix of reference books on applied microscopy, and a synopsis of the course of laboratory practice in introductory chemical microscopy at Cornell University.

THE Dr. Alexander Wacker Company for Electrochemical Industry of Munich will shortly put into production a new factory for making ethyl alcohol from calcium carbide as raw material with an annual capacity of 250,000 hectolitres.

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Personal Notes

MR. H. R. ARMITAGE has ceased to be a director of the Bradford Dyers Association, Ltd.

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MR. H. HUMPHREYS JONES, a member of the Society of Public Analysts, was recently appointed a Justice of the Peace.

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MR. ERNEST HENRY PARRY, a director of British Alkaloids, Ltd., among other countries, left estate valued at £198,603 (net personalty £181,507).

* * * *

MR. JOHN FERGUSON, vice-chairman of British Insulated Cables, Ltd., and a director of British Copper Refineries, Ltd., left gross estate of the value of £63,816.

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MISS A. A. NICHOLS, M.Sc., who recently resigned from the post of research assistant in dairy bacteriology at the Hannah Dairy Research Institute, Ayr, has taken up her appointment as milk inspector under the Department of Health for Scotland.

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MR. S. J. EDWARDS, B.Sc., M.R.C.V.S., until recently a member of the staff of the Hannah Dairy Research Institute, Ayr, who has now taken over an appointment at Compton, Berkshire, was made presentations recently by veterinary practitioners and farmers in Ayrshire.

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MR. H. M. MASON, chief chemist of Joseph Mackintosh and Sons and A. J. Caley and Son, Norwich, addressed members of the Institute of Chemistry at the Norwich Technical College last week, on the subject of "Tasting," in its relation to the manufacture of confectionery.

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VISCOUNT LEVERHULME, SIR ROBERT PICKARD, D.Sc., F.R.S., AND SIR FRANK SMITH, F.R.S., are among those who have been appointed by the Minister of Labour, to serve on a council to advise on the utilisation in war time in Government departments or elsewhere of persons with scientific, technical, professional and higher administrative qualifications.

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MR. F. S. LIDDICOAT, chief representative in England of the Paper Makers Importing Co., Easton, U.S.A., director and secretary of the Paper Makers Chemical Co., Ltd., Erith, and director and secretary of the Newton Abbot Clay Co., Ltd., was recently installed as Worshipful Master of the "Peace and Harmony" (496) Lodge of Freemasons at St. Austell, Cornwall.

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MR. FRANK S. RUSSELL is shortly to relinquish the chairmanship of General Refractories, Ltd., but will remain on the board. He will be succeeded in the chair by SIR RONALD MATTHEWS, the vice-chairman. Making this announcement at a banquet given to the staff on Saturday to celebrate the silver jubilee of the business and his own sixtieth birthday, Mr. Russell said that he had been associated with the industry for forty-five years.

OBITUARY

MR. ROBERT CHRISTIE, B.Sc., process manager at the I.C.I. plant, Fleetwood, died on January 18, at Thornton, at the age of 45.

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MR. WILLIAM CUNNINGHAM, who joined the Etna Iron and Steel Co., Ltd., Wishaw, 50 years ago, and later became one of the senior partners and managing director, has died at Wishaw. He was a member of the British Iron and Steel Institute and of the West of Scotland Iron and Steel Institute. He retired a year ago, and was succeeded as managing director of the Etna Iron and Steel Company by his son, Mr. James S. Cunningham.

MR. W. BROOKE, M.P. for Batley and Morley, Yorks, and an official of the Amalgamated Society of Dyers, died on January 21, at the age of 42.

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MR. FRANK MORETON THOMAS, former stores manager to the Port of London Authority and one of the founders of the Birmingham Metallurgical Society, has died at the age of 64.

TO-DAY'S ANNIVERSARY

BENOIT PIERRE EMMILE CLAPEYRON, professor at the Ecole de Ponts et Chaussées, Paris, whose name is associated with thermodynamics, died on January 28, 1864. In 1834 he followed up the work of Carnot, who first calculated the extent to which heat can be converted into work for the case of a perfect gas, and presented Carnot's results in analytic form. On the basis of the conclusions which were reached by Carnot and Clapeyron, and in conjunction with the law of thermodynamics discovered in 1842, Rudolf Clausius (1850), and Lord Kelvin, ultimately deduced a second law of thermodynamics which immediately became important in matters relating to the efficiency of steam engines. This law was successfully applied to chemical processes in 1869, when A. C. Horstmann, studying the sublimation of ammonium chloride, found that at each temperature a certain definite vapour pressure was established as in the case of liquid.

Foreign Chemical Notes

Finland

FORMATION IS ANNOUNCED in Abo of the O.Y. Arizon A.B. with a capital of 150,000 Finnish marks (which can be increased to 450,000 marks) to engage in the production and marketing of technical chemicals.

France

WORK IS TO COMMENCE SHORTLY upon the isolation of barytes from deposits in the Avène region of the Department of Hérault.

IRON PYRITES DEPOSITS with a declared sulphur content of 40 per cent. have been located in the Department of Haute-Garonne and plans are being worked out for their exploitation in the near future.

IN THE NANCY-STRASBURG REGION a systematic examination of the extensive shale oil deposits has been in progress for some time and is being continued in view of the potentialities of the finds as an emergency source of oil. With a total estimated yield of 10 million tons crude oil, the percentage oil content of the deposits ranges from 4 per cent. at Creveney to 5.2-5.4 per cent. at Errouville so that large scale exploitation does not enter into consideration under present conditions.

Italy

CHESTNUT WOOD will be the raw material for a new cellulose-producing factory now under construction at Turin.

THE SOC. ITALIANA DEL BROMO is constructing a new plant for extracting bromine from the waste liquors of salt works at Cagliari.

EXTENSIONS TO THE SYNTHETIC RESIN PLANT of the Soc. Nazionale Chimica at Castellanza will bring the output of urea-formaldehyde and like resins to 750 tons per annum.

AN OPTIMISTIC PICTURE OF THE POTENTIALITIES OF SUGAR GRASS (*Sorghum saccharatum*) as an Italian source of sugar and cellulose is drawn by A. Cittadini, of the Sindacato Cellulosa Pomilia in La Chimica e l'Industria, of December, 1938. After extracting the sugar from the cane by the usual methods, the cellulose is isolated by the Pomilio chlorine gas method. This crude cellulose contains about 70 per cent. alpha-cellulose and the proportion can be raised by refining treatment to over 90 per cent.

General News

THE ANNUAL BRUSSELS INTERNATIONAL FAIR will be held this year from March 12 to March 26.

THE VALOR CO., LTD., Birmingham, have moved their London office to Dorland House, 14-16 Regent Street, London, S.W.1.

THE LENSBOURY BRITANNIC PLAYERS, who are members of the staffs of Shell-Mex, Anglo-Iranian, Burnah and other oil companies, presented "A Hundred Years Ago," by S. and J. Quintero, at the Cripplegate Theatre, London, on January 17 and 18.

ABOUT 90 BARRELS OF OIL were destroyed and buildings were damaged when fire broke out at the premises of Alfred Hoppes, Sons and Co., Ltd., oil refiners, Bootle, last week. The local fire brigade prevented the flames from spreading to a warehouse where large quantities of oil were stored.

IN A REFERENCE TO THE BECKMAN pH METER (industrial model) on page 5 of our issue of January 5 last, it was stated that this instrument is made by Griffin and Tatlock, Ltd. We are now informed that it is an American instrument and is not only supplied by Griffin and Tatlock, Ltd., but also by A. Gallenkamp and Co., Ltd.

R. B. PULLIN AND CO., LTD., scientific instrument makers, West Earling, have decided to extend their activities by making scientific optical apparatus. A new factory is to be erected to keep this new development separate from present manufactures, and an increase in trading is anticipated for the company during 1939, according to Mr. R. B. Pullin, the chairman of the company.

THE FIRST BIG WORKS ERECTED IN GERMANY for the production of Buna synthetic rubber under the Four-Year Plan will start operations shortly. The works are situated at Schopkau, near Halle. Other works are to be erected in various parts of the Reich. It is claimed that within a few weeks it will be possible to divert a considerable part of the German consumption from natural rubber to Buna.

THE RECENT RECOMMENDATION OF THE STANDING COMMITTEE OF THE MERCHANDISE MARKS ACT that an Order in Council should be made prohibiting the importation or sale, wholesale or retail, of imported margarine unless it bears an indication of origin, is said to be helping the home producer. The average weekly production of margarine in Great Britain during 1938 was 3,995 tons, compared with 3,553 tons during 1937.

FRENCH FINANCIAL INTERESTS are reported to be considering the erection of an ammonium sulphate plant in Portugal (according to the American Consulate-General at Lisbon). The proposed plant will employ the Casale process, and the production capacity has been placed at 30,000 metric tons of ammonium sulphate annually. Other products proposed are synthetic ammonia, nitric acid, sulphuric acid, and nitrogenous fertilisers.

AN UNUSUAL ADVERTISEMENT appeared in Plymouth daily newspapers last week. The notice stated that in order to contradict certain false reports which had been circulated, Frank Hughes Pomery thereby declared that he ceased to be employed by Odams Nitrophosphate and Chemical Co., Ltd., Topsham, on September 30, 1937, upon which date he was placed on the retired list, with pension, by National Fertilisers, Ltd., and that he wished to record publicly his grateful thanks to National Fertilisers, Ltd., for the unfailing kindness, generosity and consideration which they had shown to him at all times.

UNITED STATES EXPORTS of chemicals and related products, including medicinals and soaps, were valued at \$156,000,000 during 1938, according to estimates prepared by the Chemical Division of the American Bureau of Foreign and Dominion Commerce. This was a decline of around 13 per cent. from the preceding year's total, and approximately the same as in 1936. During the 5-year period, from 1934 to 1938, inclusive, American export trade in chemicals and related products has recorded a value gain of 50 per cent. The loss recorded in exports of chemicals and related products during 1938 was due very largely to the lowered volume, and in some instances to lower price levels, for such products as naval stores, certain finished and crude coal-tar products and pigments.

From Week to Week

THE CLYDESDALE STEEL WORKS OF STEWARTS AND LLOYDS, which have been closed since Christmas, were re-opened on Monday. Steel billets, which are used for the manufacture of seamless tubes, are now the chief production of these works.

RECORDS OF OVER 1,000 LONDON WELLS are described, 565 of them for the first time, in a Memoir of the Geological Survey of Great Britain on the Water Supply of the County of London from Underground Sources, issued by the Department of Scientific and Industrial Research (published H.M. Stationery Office, 6s. net).

IN OUR REPORT last week (*THE CHEMICAL AGE*, January 21, 1939, p. 47) of the award of the Perkin Medal to Dr. Henry Dreyfus, chairman and joint managing director of British Celanese, Ltd., it was wrongly stated that the Medal was instituted in 1928. The award was actually instituted in 1907; the award made previously to that to Dr. Dreyfus was in 1928.

DELIVERING A PUBLIC LECTURE on "Chemistry and the Modern World," in University College, Dundee, on January 21, Professor W. F. K. Wynne-Jones, Professor of Chemistry at the college, stressed chemistry's need for assistance from the community in general, particularly from people who had had the good fortune to make vast sums of money out of industrial processes discovered by scientific research. He pointed out that it was impossible for industry to carry on without pure scientific research.

IN CONNECTION WITH the dispute between miners and the South Crofty (Cornwall) Tin Mine, the Transport and General Workers' Union recently issued a statement alleging that the mine was making enormous profits. This was repudiated by the management who stated that during the first six months of 1938 the mine actually made a loss of £2,350, and, but for the fact that the company controlled also the profitable wolfram mine at Castle-an-Dinas, they would not have been able to declare any dividends.

JAPAN'S ADVANCE in all branches of industrial activity was notable in 1937, according to a preliminary report made by the Section of Statistics of the Commerce and Industry Ministry. Reflecting the emergency conditions prevailing in Japan proper and the drive for expansion in the heavy industries, the estimated output of the chemical industry increased 43.1 per cent. to \$870,000,000. The chemical industry in Chosen (Korea) had a value of output in 1937 of \$87,825,000, showing a gain of 56 per cent. over 1936.

SPEAKING ON "Recent Developments in Pharmaceutical Chemistry," on January 20, to a joint meeting held in Glasgow, of the local branches of the Institute of Chemistry, the Chemical Society, and the Society of Chemical Industry, Mr. E. J. Schorn, lecturer in pharmaceutical chemistry at the Royal Technical College, Glasgow, said that since the introduction of the British Pharmacopoeia in 1932, great progress had been made in the analytical control of drugs. He pointed out that substances hitherto regarded as active constituents of crude drugs might now require to be considered as only fragments of the real active agents. Mr. Schorn stressed the biological trend in pharmacy and medicine, and expressed the view that this should be developed and encouraged in the training of the chemist.

THE AREA ALLOTTED TO DATE IN THE BRITISH INDUSTRIES FAIR, which opens on February 20 in London and Birmingham is 816,091 sq. ft. to 2,158 exhibitors, compared with 850,810 sq. ft. to 2,243 exhibitors at this time last year. At Olympia the area is 273,911 sq. ft. with 895 exhibitors, as compared with an area of 297,487 sq. ft. and 985 exhibitors in 1938. It was explained that an improved lay-out at Olympia had rendered unavoidable some sacrifice of exhibiting space. Buyers in sixty-six countries have already intimated that they are coming to the Fair, and advance information received at the Department of Overseas Trade indicates that the number expected is already twenty-five per cent. greater than at this time a year ago. To enable buyers and exhibitors to meet together under convivial circumstances a dinner-ball is being held in connection with the Fair at Grosvenor House on March 1. The event is being promoted by the British Women's Hospitality Committee and tickets are obtainable from Lady Vansittart, 17 Chesham Street, Belgrave Square, S.W.1, at 25s. (exhibitors) and 30s. (others).

AN 8,000-TON CARGO OF RAW SUGAR from Australia will provide work for 200 men at the Sugar Beet Corporation factory at Prestonhall, Cupar. Refining will begin early in February.

VOLUME TWENTY-FOUR of the Collected Researches of the National Physical Laboratory, containing papers relating mainly to standards, has just been published by H.M. Stationery Office. (22s. 6d. net).

IT IS ANNOUNCED THAT A CALCIUM CARBIDE FACTORY is to be erected at Llanerch-y-Mor, Mold, Flintshire, the North Wales Carbide Corporation, Ltd., being formed with a capital of £1,000,000 to carry out the project. It is said that when the factory is in full working order it will employ 1,500 men.

OVER 100 PEOPLE ATTENDED THE INAUGURAL MEETING of the Scottish branch of the Institute of Petroleum at the North British Station Hotel, Edinburgh, on January 20. Considerable interest has been shown in the formation of the new branch which already has 50 full members and 28 branch members. Professor W. M. Cumming, Royal Technical College, Glasgow, and Mr. Robert Crichton, are hon. secretary and president respectively.

THE MARQUESS OF LINLITHGOW opened early this month the Indian Central Jute Committee's research laboratories at Calcutta. He was, himself, in no small measure responsible for the coming into being of the laboratories, as it was the Royal Commission on Agriculture of which Lord Linlithgow was the chairman that recommended the establishment of the Central Jute Committee for research and inquiry into the jute industry of India. The laboratory will provide facilities for research of a fundamental character. Work on the physical and chemical characteristics of the fibre will be correlated with practical spinning tests.

FIGURES FOR 1938 reveal the serious decline in all sections of the china clay industry, especially when compared with the preceding year. The trade done in December was 50,088 tons against 86,314 tons for the corresponding month in 1937 and 76,000 tons in December, 1936. Total shipments made in 1938 were as follows: 647,728 tons of china clay compared with 891,314 in 1937; 33,485 tons of china stone compared with 46,886 in 1937; 19,657 tons of ball clay compared with 31,806 in 1937. The figures show a decline of over 279,000 tons over the previous year. The trade agreement with the United States is not being commented upon in official circles very optimistically, but it is hoped that it will nevertheless be the means of recovering some of the lost markets in that country.

THE EQUIPMENT FOR THE MANUFACTURE OF ABSOLUTE ALCOHOL from molasses in Mysore has already been installed and is in operation. Mr. C. J. H. Penning, general manager of the Mysore sugar factory, is of the opinion that 5,000 tons of molasses can at best produce 350,000 gallons of rectified spirit or absolute alcohol and that in that case recovery has to be very high.

THE FEDERATION OF THE BELGIAN CHEMICAL INDUSTRIES has issued its Directory for 1939. Published with a view to giving purchasers in all parts of the world information as to the products manufactured by members of the Federation, the Directory contains lists of officials and members, a classified list of chemicals, details of equipment and manufactured products, a section devoted to the Belgian chemical industry and English, Spanish, and German keys to the classified indexes.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

South Africa.—The Union Tender and Supplies Board, Pretoria, is calling for tenders for the supply and delivery of 4,000 lb. of beeswax. Tenders, endorsed "Tender No. 715, Post Office," should be addressed to the Secretary, Union Tender and Supplies Board, 271 Visagie Street, P.O. Box 371, Pretoria, S. Africa, by whom they will be received up to 9 a.m. on March 2, 1939. A sample of the beeswax which it is proposed to supply must be submitted with the tender. (Ref. No. T 17673/39.)

British West Indies.—An agent and laundry proprietor established at Nassau wishes to obtain the representation, on a purchasing or commission basis, of United Kingdom manufacturers of soap, soda, blue and other laundry supplies. (Ref. No. 41.)

Iraq.—The Baghdad District Water Board is calling for tenders for the supply and delivery of 100 tons of sulphate of alumina in block form in double bags. Tenders to be endorsed "Tender for Sulphate of Alumina," to be addressed to the Baghdad District Water Board, Baghdad, where they will be received up to 9 a.m., on February 18, 1939.

Egypt.—The Egyptian Ministry of Public Health is calling for tenders for the supply and delivery of drugs, etc., required for the Drugs Stores during the year ending April 30, 1940. The schedule of requirements includes drugs, chemicals, galenicals, and packed articles. Tenders should be addressed to the Director of Stores, Ministry of Public Health, Cairo, by whom they will be received up to 10 a.m. on March 6, 1939. (Ref. No. T.17664/39.)

Chemical and Allied Stocks and Shares

ON balance for the week movements in share values have been to lower levels, sentiment on the Stock Exchange having remained entirely under the influence of a disposition to await the next developments in international political affairs. As in other sections of the market for industrial shares, shares of companies associated with the chemical and kindred industries have again moved to lower levels, but numerous relatively steady features were not lacking.

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Imperial Chemical fluctuated somewhat sharply, but are 29s. 3d. at the time of writing, which compares with 29s. 9d. a week ago. Fison Packard and Prentice were maintained around 38s. 9d., and Boots Pure Drug are 38s. 9d. compared with 39s. 3d. a week ago. Sangers at 20s. 10½d. are little changed on balance, as are Timothy Whites and Taylors, which are 24s. 6d., compared with 24s. 10½d.

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On the other hand Turner and Newall reacted from 75s. 9d. to 72s. 6d., and British Aluminium were lower at 50s. 9d., while other of the more prominent shares which moved very closely with the general trend of the Stock Exchange, were Murex, British Oxygen, Tube Investments, Stewarts and Lloyds and Swedish Match. International Nickel were lower in common with most dollar shares which have a large following on both sides of the Atlantic, although later a firmer tendency appeared to be developing.

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Lever and Unilever have declined further to 31s. 6d., due, it was reported, to further selling from the Continent. Associated Cement were reactionary at 61s. 10½d., which compares with 65s. a week ago. The dividend of the latter company falls to be declared in March and most market men are assuming that a moderate reduction is likely to be made. British Plaster Board are 24s. 3d., which represents a loss of 1s. 3d. on the week. B. Laporte were around 81s. 3d., but in this case the price did not

appear to be tested by much business. Greeff-Chemicals Holdings were unchanged at 5s. 7½d., as were William Blythe 3s. shares, which continued to be quoted at 5s. 3d.

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Courtaulds have moved down to 24s. 4½d., largely as a result of the general trend of markets, although the disposition in most quarters is to assume that the forthcoming results may not show a dividend of more than 5 per cent. for the year. British Celanese also made a lower price, as did the majority of the leading textile shares. Triplex Glass are 27s. 6d., compared with 28s. 9d. a week ago, but United Glass Bottles ordinary have remained around 48s. at the time of writing. British Oil and Cake Mills preferred ordinary were maintained at 41s. and United Premier Oil and Cake were again around 7s. 4½d.

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Pinchin Johnson went back from 23s. 10½d. to 22s. 9d., and International Paint were lower at 75s. 7½d., but Lewis Berger and Indestructible Paint were unchanged. Blythe Colour Works ordinary, on which some market men are suggesting a rather larger dividend may be paid, were maintained at 7s. 9d., while Cellon ordinary shares were quoted at 15s.

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Dorman Long, Colvilles, Consett Iron and other leading iron and steel securities declined sharply, but later the lower prices were reported to be attracting buyers. Baldwins were relatively steady, aided by the hope that the dividend may be maintained. Imperial Smelting reacted further to 9s. 6d., awaiting the decision as to the application for an increased duty on foreign imported zinc. Borax Consolidated were subject to rather sharp fluctuations and are 23s. 4½d. at the time of writing, there being varying estimates of the dividend current in the market.

"Shell," Royal Dutch and other oil shares with an international market declined sharply at the beginning of the week, but later showed a slightly better tendency.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

PRODUCTION OF EMULSIONS FROM SYNTHETIC RESINS.—Catalin, Ltd., and F. Riesenfeld. 37694.

STABILISING OF ORGANIC MATERIALS in the presence of copper.—E. I. du Pont de Nemours and Co. (United States, Dec. 29, '37.) 37753; (United States, Jan. 20.) 37754.

MANUFACTURE OF DYES.—G. H. Ellis, H. C. Olpin and J. Wright. 37980.

MANUFACTURE OF AZO-DYESTUFFS.—J. R. Geigy, A.-G. (Switzerland, Dec. 29, '37.) 37725; (Switzerland, June 4.) 37726.

MANUFACTURE OF NOVEL ETHERS containing fluorine.—T. B. Gowland, and Imperial Chemical Industries, Ltd. 37751.

MANUFACTURE OF HYDROXY-ALKYLAMIDES.—R. Greenhalgh and Imperial Chemical Industries, Ltd. 37915.

HALOGENATION OF ORGANIC COMPOUNDS.—I. G. Farbenindustrie. (Germany, Dec. 29, '37.) 37745.

MANUFACTURE, ETC., OF GLYCIDE NITRATE.—I. G. Farbenindustrie. (Germany, Dec. 30, '37.) 37746.

MANUFACTURE OF INTERMEDIATE PRODUCTS for the production of methine dyestuffs.—I. G. Farbenindustrie. (Germany, Dec. 30, '37.) 37842, 37843; (Germany, Nov. 2.) 37844.

MANUFACTURE, ETC., OF NITRIC ACID ESTERS OF GLYCERINE.—I. G. Farbenindustrie. (Germany, Jan. 3.) 37887.

PRESERVATION OF RUBBER.—Imperial Chemical Industries, Ltd. (United States, Dec. 29, '37.) 37793.

VAPOUR PHASE BLEACHING.—Imperial Chemical Industries, Ltd. (United States, Dec. 31, '37.) 37916.

PURIFICATION OF SULPHUR.—H. G. James, and Imperial Chemical Industries, Ltd. 37914.

PURIFICATION OF CALCIUM SULPHATE.—P. Kubelka. (Czechoslovakia, Dec. 29, '37.) 37789.

UTILISATION OF THE RESIDUE resulting from the combustion of pulverulent, etc., carbonaceous materials.—F. G. Mitchell, and J. E. Temple. 37867.

REMOVAL OF ALUMINIUM from tin-containing metals, etc.—National Lead Co. (United States, Jan. 4.) 37860.

TOILET SOAPS.—E. Pick. (Czechoslovakia, July 4.) 37733.

MANUFACTURE OF CARBON MONOXIDE-CONTAINING GASES.—Power Gas Corporation, Ltd., and F. F. Rixon. 37693.

MANUFACTURE OF DERIVATIVES OF STEROLS.—Schering, A.-G. (March 7.) (United States, March 5, '37.) 37772.

PRODUCTION OF VALUABLE HYDROCARBONS by hydrogenation under pressure.—Soc. Belge de l'Azote et des Produits Chimiques du Marly, and Soc. Chimique de la Grande Paroisse. (France, Dec. 31, '37.) 37985.

MANUFACTURE OF MELAMINE.—Soc. of Chemical Industry in Basle. (Switzerland, Dec. 31, '37.) 37727.

ELECTROLYTIC MANUFACTURE OF HYDROGEN PEROXIDE.—G. Zotos. 37799.

PLASTICISING OF RUBBER.—E. I. du Pont de Nemours and Co. (United States, Dec. 31, '37.) 87.

ELECTROLYTIC TREATMENT OF THE INTERIOR SURFACES OF METAL CONTAINERS.—J. Cartner, W. Clayton, R. I. Johnson and C. G. Summer. 176.

COATING OF METAL CONTAINERS by electrodeposition.—J. Cartner, W. Clayton, R. I. Johnson, C. G. Summer, and J. F. Morse. 175.

INCREASING THE WETTING-OUT POWER OF ALKALI LYSES.—G. B. Ellis (Chemical Works, formerly Sandoz). 287.

MANUFACTURE OF ALKALINE LIQUORS.—F. Holt, and Imperial Chemical Industries, Ltd. 201.

MANUFACTURE OF METHYL CELLULOSE.—A. A. Houghton, C. M. Taylor, and Imperial Chemical Industries, Ltd. 198.

PURIFICATION OF METAL SALT SOLUTIONS.—I. G. Farbenindustrie. (Germany, Jan. 8, '38.) 134.

MANUFACTURE OF POLYMERISATION PRODUCTS of 2-chloro- or 2-bromo-butadiene-1,3.—I. G. Farbenindustrie. (March 2, '38.) 203; (March 2, '38.) (Germany, June 2, '37.) 204.

RECOVERY OF POLYNUCLEAR COMPOUNDS.—I. G. Farbenindustrie. (Germany, Jan. 6, '38.) 283.

CATALYTIC REACTIONS.—H. W. K. Jennings (Kellogg Co.). 70.

MANUFACTURE OF OXIDATION PRODUCTS of trichlorethylene.—F. W. Kirkbride, and Imperial Chemical Industries, Ltd. 321.

HIGH-VACUUM DISTILLATION.—Kodak, Ltd. (Distillation Products, Inc.). 9.

PROCESS FOR SEPARATELY RECOVERING COPPER and cobalt from solutions.—Koninklijke Zwavelzuurfabrieken voorheen Ketjen N.V., and Es, A. C. van. 208.

PREPARATION OF METALS.—E. Lux, and K. Kohn. 300.

MANUFACTURE OF ORGANIC PRODUCTS.—N. McLeish, J. W. C. Crawford, T. K. Wood, and Imperial Chemical Industries, Ltd. 199.

METHOD FOR THE PRODUCTION OF URANE COMPOUNDS, ETC.—Parke, Davis, and Co. (United States, Jan. 3, '38.) 144.

CONCENTRATING BARITE from its ores.—Phosphate Recovery Corporation. (United States, Jan. 15, '38.) 38.

PRODUCTION OF ANHYDROUS MAGNESIUM CHLORIDE FROM MAGNESIUM LYES, ETC.—Magnesium Elektron, Ltd. (Germany, Jan. 22, '38.) 318.

PRODUCTION OF AZO DYESTUFFS on cellulose materials, etc.—G. J. Marriott, K. H. Saunders, and Imperial Chemical Industries, Ltd. 200.

RESINOUS CONDENSATION PRODUCTS.—H. J. Tattersall, and Imperial Chemical Industries, Ltd. 202.

PRODUCTION OF HYDROCARBONS.—Anglo-Iranian Oil Co., Ltd., A. E. Dunstan, and S. F. Birch. 339.

MANUFACTURE OF REFRACTORY MATERIALS.—Basic Dolomite, Inc. (United States, Jan. 15, '38.) 588.

PRODUCTION OF RESINOUS CONDENSATION PRODUCTS.—Beck Koller & Co. (England), Ltd. (Hovey and Hodgins). 960, 961, 962.

MANUFACTURE OF UNSATURATED ALIPHATIC COMPOUNDS.—British Celanese, Ltd. (United States, Jan. 11, '38.) 946.

MANUFACTURE OF AZODYESTUFFS.—A. Carpmael (I. G. Farbenindustrie.) 606.

ELECTROLYTIC PROCESSES, ETC.—C. Carter, A. P. Lowes, and Imperial Chemical Industries, Ltd. 540.

DYEING CELLULOSE ESTERS.—Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann. (France, Jan. 10, '38.) 762.

POLYMERISATION OF UNSATURATED ORGANIC COMPOUNDS.—Distillers Co., Ltd., and H. M. Stanley. 493.

POLYMERIC MATERIAL.—E. I. du Pont de Nemours and Co. (United States, Jan. 14, '38.) 787.

MANUFACTURE OF REFINED PRODUCTS from hydrocarbon mixtures. J. G. Fife (Naamlooze Venootschap de Bataafsche Petroleum Maatschappij). 602.

MANUFACTURE OF ISATIN DERIVATIVES.—J. R. Geigy, A.-G. (Switzerland, Jan. 14, '38.) 667.

MANUFACTURE OF ORGANIC HYDROXY COMPOUNDS, ETC.—Glaxo Laboratories, Ltd., F. A. Robinson, and J. C. L. Resugan. 835.

FREEING WATER FROM SILICIC ACID.—W. W. Groves (I. G. Farbenindustrie.) 682.

MANUFACTURE OF HYDROGEN PEROXIDE.—P. Harrower, R. C. Cooper, O. H. Walters, and Imperial Chemical Industries, Ltd. 538.

MANUFACTURE OF WHITE LEAD.—H. G. Hills. 751.

MANUFACTURE OF *a*-NAPHTHAACETYL AMINO ACIDS.—F. Hoffman-La Roche and Co., A.-G. (Switzerland, Feb. 2, '38.) 797.

MANUFACTURE OF AMIDE-LIKE DERIVATIVES of homologues of isoxazole carboxylic acids.—F. Hoffman-La Roche and Co., A.-G. (Germany, Jan. 17, '38.) 798.

MANUFACTURE OF CREOSOTE from fluid coal in the cold condition. J. Jenet. (Belgium, Jan. 8, '38.) 688.

RECOVERY OF CONCENTRATED ALKYLENE CHLORHYDRINS from their dilute aqueous solutions.—G. W. Johnson (I. G. Farbenindustrie.) 690.

ANTHRAQUINONE DYESTUFFS.—F. Lodge, and Imperial Chemical Industries, Ltd. 975.

DISTILLATION OF CARBONACEOUS MATERIALS.—J. S. Morgan. 356.

DESTRUCTIVE DISTILLATION.—J. S. Morgan. 360.

METHOD OF DISTILLING COAL, ETC.—J. S. Morgan. 361.

VULCANISATION OF RUBBER.—Hermes. Patentverwertungs-Ges. (Germany, Jan. 5, '38.) 414.

ELECTROLYTIC PRODUCTION OF MANGANESE.—H. E. Potts (Metallic Manganese Co., Ltd.). 585, 586.

METHOD FOR THE MANUFACTURE OF CONCENTRATED DURABLE FLUID SOLUTIONS.—A. R. J. Ramsey (Chemische Fabrik Schürholz). 951.

METHOD FOR THE MANUFACTURE OF DURABLE CONCENTRATED SOLUTIONS of medicinal substances.—A. R. J. Ramsey (Chemische Fabrik Schürholz). 952.

MANUFACTURE OF ANHYDROUS BERYLLIUM FLUORIDE free from oxide.—Seri Holding Soc. Anon. (Italy, Jan. 10, '38.) 607.

SYNTHETIC RESINS, ETC.—S. Smith and Sons (Motor Accessories), Ltd., and V. J. S. Russell. 513.

EXTRACTION OF BROMINE.—W. J. Tennant (Dow Chemical Co.). 666.

DESULPHURISATION OF CAST IRON.—K. M. Tigerschild. (Sweden, Jan. 24, '38.) 531; (Sweden, March 30, '38.) 532.

TREATMENT OF OLEFINIC HYDROCARBONS.—Universal Oil Products Co. (United States, May 31, '38.) 856.

Complete Specifications Open to Public Inspection

DYEING AND PRINTING.—Soc. of Chemical Industry in Basle. July 10, 1937. 4344/38.

METHOD OF PREPARING UREA DERIVATIVES suitable for use as vulcanisation accelerators.—Wingfoot Corporation. July 15, 1937. 7978/38.

MANUFACTURE OF ALKALI PHOSPHATES.—Chemische Fabrik Budenheim, A.-G. July 15, 1937. 15804/38.

FRACTIONAL SEPARATION OF HYDROCARBON VAPOURS.—Houdry Process Corporation. July 10, 1937. 16390/38.

PREPARATION OF WATER-SOLUBLE DYESTUFFS of the anthraquinone series.—Chemical Works, formerly Sandoz. July 13, 1937. 19465/38.

METHOD FOR DIMINISHING the swelling-capacity of phenol resins.—G. Farbenindustrie. July 13, 1937. 19554/38.

ELECTRODEPOSITION OF COPPER, and baths therefor.—United Chromium, Inc. July 13, 1937. 19745/38.

METHOD FOR THE PRODUCTION OF OXYGEN BATHS by catalytic means.—M. L. Heim. July 10, 1937. 20116/38.

CONCENTRATION OF ALIPHATIC ACIDS.—British Celanese, Ltd. July 13, 1937. 20120/38.

METHOD OF PRODUCING A STABILISED DIAZO COMPOUND.—Calco Chemical Co., Inc. July 12, 1937. 20132.

PROCESS OF COLOURING MATERIAL, and compositions for this purpose.—Calco Chemical Co., Inc. July 12, 1937. 20133/38.

RESINOUS COMPOSITIONS, and articles made therefrom.—British Thomson-Houston Co., Ltd. July 10, 1937. 20174/38.

ZINC ALLOYS.—National Smelting Co., Ltd. July 12, 1937. 20259/38.

TREATMENT AND APPLICATION OF GLASS FIBRES and other silicious substances.—Naamlooze Vennootschap Maatschappij Tot Beheer en Exploitatie van Octrooien. July 16, 1937. 20483/38.

MANUFACTURE OF AZO-DYESTUFFS.—Soc. of Chemical Industry in Basle. July 10, 1937. 20491/38.

PRODUCTION OF CAPILLARY-ACTIVE SUBSTANCES.—Deutsche Hydrierwerke, A.-G. July 10, 1937. 20529-30/38.

MANUFACTURE OF TITANIUM and alloys thereof in a cold-malleable form.—W. Kroll. July 10, 1937. 20533/38.

METHOD AND APPARATUS FOR REFINING OR CLEANING OILS.—A. Schlegel. July 10, 1937. 20563/38.

DYE-FORMING MATERIAL.—May Chemical Corporation. July 13, 1937. 20604/38.

MANUFACTURE OF DERIVATIVES of the saturated and unsaturated cyclopentanopolyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. July 12, 1937. 20640/38.

MANUFACTURE OF *a*-DICARBONYL COMPOUNDS of the cyclopentanopolyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. July 13, 1937. 20642/38.

METHOD FOR PREPARING AZO-COMPOUNDS.—Laboratoires Francais de Chimiotherapie, and A. Girard. July 12, 1937. 20658/38.

REFRACTORY ALLOY COMPOSITIONS.—C. A. Laise. July 13, 1937. 20696/38.

PRODUCTION OF CAPILLARY-ACTIVE SUBSTANCES.—Deutsche Hydrierwerke, A.-G. July 14, 1937. 20789/38.

POLYMERISATION OF UNSATURATED ALIPHATIC HYDROCARBONS.—E. I. du Pont de Nemours and Co. July 13, 1937. 20793/38.

MANUFACTURE OF AMINO KETONES.—J. R. Geigy, A.-G. July 16, 1937. 20895/38.

MANUFACTURE OF KETONES of the cyclopentanopolyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. July 14, 1937. 20901/38.

MANUFACTURE OF OXYTHIOETHERS.—Soc. of Chemical Industry in Basle. July 14, 1937. 20905/38.

PREPARATION OF AZO-COLOURS on the fibre.—Chemical Works, formerly Sandoz. July 15, 1937. 20914/38.

HARDENING OF IRON by carbonisation.—Gotthard Sachsenberg Zentralges. July 15, 1937. 20915/38.

AZO DYESTUFFS, their manufacture, and applications.—Imperial Chemical Industries, Ltd. July 14, 1937. 20930/38.

PRODUCTION OF DIELECTRICALLY HIGH-QUALITY CERAMIC SUBSTANCES.—Fides Ges. Fur Die Verwaltung und Verwertung von Gewerblichen Schutzrechten. July 16, 1937. 21108/38.

PRODUCTION OF DIELECTRICALLY HIGH-QUALITY TITANIUM DIOXIDE.—Fides Ges. Fur Die Verwaltung Und Verwertung Von Gewerblichen Schutzrechten. July 16, 1937. 21109/38.

PRODUCTION OF GLYCERINE from fermented carbohydrate-containing materials.—Distillers Co., Ltd. July 16, 1937. 21155/38.

MANUFACTURE OF CHEMICAL COMPOUNDS.—Deutsche Gold- und Silber-Scheideanstalt Vorm. Roessler. April 1, 1937. 1483/38.

Specifications Accepted with Date of Application

MANUFACTURE OF RESIN-LIKE PRODUCTS.—Deutsche Hydrierwerke, A.-G. July 7, 1936. 498,409.

MINERAL OIL COMPOSITIONS.—Standard Oil Development Co. Aug. 1, 1936. 498,046.

PREPARATION OF HYDROXY AROMATIC SULPHIDES, selenides, and tellurides.—Standard Oil Development Co. Aug. 21, 1936. 498,315.

POLYHYDRO ALCOHOL-POLYCARBOXYLIC ACID CONDENSATION PRODUCTS.—S. L. M. Saunders, and Pinchin, Johnson and Co., Ltd. July 8, 1937. 498,414.

MANUFACTURE AND PRODUCTION OF CHROME YELLOW.—G. W. Johnson (I. G. Farbenindustrie.) July 9, 1937. 498,487.

PHOSPHATE GLASS.—G. W. Johnson (I. G. Farbenindustrie.) July 13, 1937. 498,049.

DYESTUFFS.—Soc. of Chemical Industry in Basle. July 14, 1936. (Samples furnished.) 498,051.

MANUFACTURE OF AZO-DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie.) July 14, 1937. 498,241.

AROMATIC POLYETHER AMINES.—Rohm and Haas Co. July 31, 1936. 498,328.

MANUFACTURE AND PRODUCTION OF BUTADIENE.—G. W. Johnson (I. G. Farbenindustrie.) July 26, 1937. 498,242.

CONVERSION OF CONSTITUENTS OF CAROB BEANS.—G. W. Johnson (I. G. Farbenindustrie.) July 29, 1937. 498,149.

SEPARATION OF NICKEL SALTS from solutions containing other heavy metals.—G. W. Johnson (I. G. Farbenindustrie.) Aug. 3, 1937. 498,152.

INCREASING THE ANTI-KNOCK CHARACTERISTICS OF HYDROCARBON OILS.—A. L. Mond (Universal Oil Products Co.). Aug. 18, 1937. 498,247.

DICYANDIAMIDEFORMALDEHYDE CONDENSATION PRODUCTS.—W. W. Triggs (Bayerische Stickstoffwerke, A.-G.) Aug. 25, 1937. 498,165.

MANUFACTURE AND PRODUCTION OF PARAFFIN WAXES free from oils.—G. W. Johnson (I. G. Farbenindustrie.) Aug. 27, 1937. 498,064.

MANUFACTURE AND PRODUCTION OF GAS-PURIFYING MASSES.—G. W. Johnson (I. G. Farbenindustrie.) Sept. 1, 1937. 498,066.

FIRE-RESISTING COMPOSITIONS for coating or impregnating textile materials.—British Insulated Cables, Ltd., F. J. Brislee, B. Wright and L. Macfarlane. Sept. 23, 1937. 498,181.

MAGNESIUM OXIDE PRODUCTS, and method of making the same. H. S. C. Fairweather (Consolidated Sciences, Inc.). Sept. 28, 1937. 498,183.

PROCESS FOR THE MANUFACTURE AND REVIVIFICATION OF ACTIVE CARBONACEOUS MATERIAL.—Naamlooze Vennootschap Octrooien Maatschappij Activit. Oct. 24, 1936. 498,201.

PRODUCTION OF WATER-SOLUBLE, NITROGENOUS COMPOUNDS.—J. R. Geigy, A.-G. July 8, 1937. 498,090.

PRODUCTION OF ALKYLATED HYDROCARBONS.—A. L. Mond (Universal Oil Products Co.). Nov. 9, 1937. 498,260.

METHOD AND APPARATUS FOR TREATING INSULATING OILS.—Okonite-Calleader Cable Co., Inc., and Okonite Co. Nov. 21, 1936. 498,215.

METHOD OF ACCELERATION OF GELATINISATION OF CELLULOSE NITRATE and liquid nitric esters, and the product thereof.—J. T. Power and K. R. Brown. Nov. 19, 1937. 498,346.

CATALYTIC METHODS OF AND APPARATUS FOR CRACKING HYDROCARBONS.—Standard Oil Development Co. Jan. 21, 1937. 498,094.

PREPARATION OF SOLID COMPOUNDS by the exothermic reaction of acid gases with alkaline gases.—Soc. Des Produits Chimiques Saponifies. Dec. 15, 1936. 498,097.

PREPARING ALKYL CHLORIDES.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Dec. 30, 1936. 498,349.

METHOD OF MANUFACTURING CEMENT CONCRETE.—P. Herrmann. Dec. 31, 1937. 498,108.

MANUFACTURE OF FUEL OILS.—Standard Oil Development Co. Jan. 30, 1937. 498,109.

INHIBITING THE OXIDATION OF OILS and other organic substances liable to oxidation by the air.—T. Sabalitschka, and E. Bohm. June 23, 1937. 498,110.

PRODUCTION OF AGENTS containing magnesium oxide and calcium carbonate from magnesium-containing substances.—A. A. Thornton (Kohle-und Eisenforschung Ges.). Feb. 3, 1938. 498,372.

UTILISATION OF THE HEAT OF COMBUSTION OF PYRITES in the manufacture of sulphuric acid by the chamber process.—A. G. Exploration Co., Ltd., and J. W. Burland. Feb. 9, 1938. 498,432.

PRODUCTION OF DIKETENE.—Consortium Fur Electro-Chemische Industrie Ges. March 13, 1937. 498,280.

CONCENTRATING MINERALS from their ores.—Phosphate Recovery Corporation. April 27, 1937. 498,450.

METHOD OF RECOVERING OLEFINE OXIDES from gaseous mixtures and hydrolysing to form corresponding glycols.—U.S. Industrial Alcohol Co. July 29, 1937. 498,119.

NITROGENOUS ORGANIC COMPOUNDS and their application.—N. W. Cusa, C. E. Salkeld, E. E. Walker, and Imperial Chemical Industries, Ltd. June 30, 1937. 498,287.

MANUFACTURE OF N: N'-DIALKYL-DIPYRAZOLANTHONYLS.—Soc. of Chemical Industry in Basle. July 30, 1936. (Divided out of 21153 (37).) 498,126.

ALKYLATION OF PARAFFIN HYDROCARBONS.—A. L. Mond (Universal Oil Products Co.). May 25, 1937. 498,127.

ISOMERISATION OF NORMAL PENTANE.—A. L. Mond (Universal Oil Products Co.). May 5, 1937. 498,463.

MANUFACTURE OF INTERPOLYMERISATION PRODUCTS.—W. W. Groves (I. G. Farbenindustrie.) April 2, 1937. 498,464.

PRODUCTION OF ALUMINA and its derivatives.—Giulini Ges. Gels. April 2, 1936. 498,510.

ISOMERISATION OF NORMAL BUTANE.—A. L. Mond (Universal Oil Products Co.). May 5, 1937. 498,512.

DEGREASING METAL ARTICLES.—L. Hargreaves, H. Tudor, N. R. Hood, and Imperial Chemical Industries, Ltd. June 8, 1937. 498,517.

MANUFACTURE OF VAT DYESTUFFS of the anthraquinone series.—A. Carpmael (I. G. Farbenindustrie.) July 7, 1937. 498,602.

IMPROVING THE PROPERTIES OF NIGROSINES and indulines.—A. Carpmael (I. G. Farbenindustrie.) July 7, 1937. 498,751.

MANUFACTURE OF QUINOLINE DERIVATIVES.—A. Carpmael (I. G. Farbenindustrie.) July 7, 1937. (Samples furnished.) 498,752.

LATEX COMPOSITIONS.—J. Klasi. July 8, 1937. 498,754.

PRODUCTION OF OXIDATION DYESTUFFS upon fibrous materials.—Soc. Anon. Des Matieres Colorantes et Produits Chimiques de Saint-Denis and R. Lantz. July 15, 1936. 498,755.

METHOD OF IMPROVING THE AGE-RESISTING CHARACTERISTICS OF RUBBER and similar deteriorable organic materials.—Wingfoot Corporation. Sept. 15, 1936. 498,524.

Weekly Prices of British Chemical Products

TRADE in industrial chemicals continues to follow a very even trend, the general movement being more or less confined to deliveries under existing contracts. Inquiries in some directions are reported to be on a good scale, but the volume of actual business put through is comparatively small. There are no outstanding price changes to record for general chemicals, rubber chemicals and wood distillation products and quotations for most items continue steady with a firm undertone. Quiet conditions continue to prevail in the coal tar section the market being without feature. A number of transactions have been completed, but the quantities involved are of little importance. It is reassuring to note, however, that on the whole the price position is keeping steady.

MANCHESTER.—Fresh bookings on the Manchester chemical market during the past week have been on no more than a quiet

scale, a factor which is largely attributed to the lack of confidence among buyers in consequence of the international situation. Contract deliveries of most descriptions of heavy chemicals, however, have been maintained at around their recent levels, and taking the market as a whole there has been no giving way in prices. Among the by-products the benzols, naphthas, toluols and xylos are probably the best sections. Values of these are reasonably steady and a fair trade is passing. Pitch, however, continues slow, and quiet conditions are also reported in carbolic and cresylic acids and one or two other classes of material.

GLASGOW.—There has been a slight improvement in the demand for general chemicals for home trade during the week, though export business still remains very quiet. Prices generally continue quite steady at about previous figures with no further alterations to report.

Price Changes

Falls: Ammonium Chloride, grey and fine white; Copper Sulphate (Manchester); Salt Cake, unground, spot; Sodium Bicarbonate, refined spot; Pitch (Manchester).

General Chemicals

ACETONE.—£39 to £43 per ton, according to quantity.

ACETIC ACID.—Tech., 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. **MANCHESTER**: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; **GLASGOW**: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 5s. 0d. per ton d/d Lancs. **GLASGOW**: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. **SCOTLAND**: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—**SCOTLAND**: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks

AMMONIUM CHLORIDE.—Grey, £17 10s. per ton, d/d U.K. Fine white, 98%, £16 per ton, d/d U.K.

AMMONIUM CHLORIDE (MURIATIC).—**SCOTLAND**: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8½d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r. mines, according to quantity. **MANCHESTER**: White powdered Cornish, £16 per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. **GLASGOW**: £12 per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 5s. per ton in casks, special terms for contract. **SCOTLAND**: £9 5s. per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. **GLASGOW**: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. **GLASGOW**: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10-cwt. drums (4-drum lots); 4½d. per lb. d/d station in single 70-lb. cylinders.

CHROMETAN.—Crystals, 2½d. per lb.; liquor, £13 per ton d/d station in drums. **GLASGOW**: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—9d. per lb., less 2½%; d/d U.K.

CHROMIC OXIDE.—11½d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0½d. per lb. **MANCHESTER**: 1s. 0½d. **SCOTLAND**: B.P. crystals, 1s. 0½d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£18 5s. per ton, less 2% in casks. **MANCHESTER**: £19 per ton f.o.b. **SCOTLAND**: £19 10s. per ton, less 5%, Liverpool in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. **GLASGOW**: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMIC ACID.—£20-£22 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins,

£3 17s. 6d. to £4 17s. 6d. per cwt. according to quantity; in drums, £3 10s. 0d. to £4 2s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 9d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—**LONDON**: White, £31 10s. ton lots; brown, £35.

GLASGOW: White crystals, £29 10s.; brown, £1 per ton less.

MANCHESTER: White, £31; brown, £30.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£31 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. **SCOTLAND**: £30 per ton, less 2½% carriage paid for 2-ton lots.

LITHARGE.—**SCOTLAND**: Ground, £30 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—Calcined, in bags, ex works, about £8 per ton.

SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—Solid (ex wharf) £5 10s. per ton. **SCOTLAND**: £7 5s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 11d. per lb.; powder B.P., 6s. 1d.; bichloride B.P. (corros. sub.), 5s. 2d.; powder B.P. 4s. 10d.; chloride B.P. (calomel), 5s. 11d.; red oxide cryst. (red precip.), 7s.; levig., 6s. 6d.; yellow oxide B.P. 6s. 4d.; persulphate white B.P.C., 6s. 1d.; sulphide black (hyd. sulph. cum. sulph. 50%), 6s. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. **SCOTLAND**: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £25 to £30 per ton according to strength, quantity and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. **GLASGOW**: £2 9s. per cwt. in casks. **MANCHESTER**: £49 to £55 per ton ex store.

PARAFFIN WAX.—**SCOTLAND**: 3½d. per lb.

POTASH, CAUSTIC.—Solid, £33 5s. to £38 per ton according to quantity, ex store; broken, £40 per ton. **MANCHESTER**: £38.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. **GLASGOW**: 4½d. per lb. **MANCHESTER**: £37 per ton.

POTASSIUM DICHLORATE.—5½d. per lb. carriage paid. **SCOTLAND**: 5½d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 6s. 3d. per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. **GLASGOW**: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—**LONDON**: 9½d. to 10½d. per lb. **SCOTLAND**: B.P. Crystals, 10½d. **MANCHESTER**: B.P. 9½d. to 11½d.

POTASSIUM PRUSSIATE.—5½d. to 6d. per lb. **SCOTLAND**: 6½d. net, in casks, ex store. **MANCHESTER**: Yellow, 6d. to 6½d.

PRUSSIATE OF POTASH CRYSTALS.—In casks, 6½d. per lb. net, ex store.

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. **GLASGOW**: Large crystals, in casks. £37 10s.

SALT CAKE.—Unground, spot, £3 8s. 6d. per ton.

SODA ASH.—Light, 98/100%, £5 17s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, 13s. 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73% £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£19-£20 per ton carriage paid North. GLASGOW: £18 10s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags in 1-ton lots. GLASGOW: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. MANCHESTER: £10 15s.

SODIUM BISULPHITE POWDER.—60/62%, £12 10s. to £14 per ton d/d in 2-ton lots for home trade.

SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£27 10s. to £32 per ton. GLASGOW: £1 11s. per cwt., minimum 3 cwt. lots.

SODIUM DICHROMATE.—Crystals cake and powder 4½d. per lb. net d/d U.K. with rebates for contracts.

SODIUM CHROMATE.—4½d. per lb. d/d U.K. 4d. per lb. GLASGOW: 4½d. net, carriage paid.

SODIUM HYPOSULPHITE.—Pea crystals, £15 5s. per ton for 2-ton lots; commercial, £11 5s. per ton. MANCHESTER: Commercial, £11; photographic, £15 10s.

SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.

SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d. GLASGOW: £1 12s. 0d. per cwt. in 1-cwt. kegs, net, ex store.

SODIUM NITRITE.—£18 5s. per ton for ton lots.

SODIUM PERBORATE.—10%, £4 per cwt. d/d in 1-cwt. drums.

SODIUM PHOSPHATE.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £16 10s. per ton delivered per ton lots.

SODIUM PRUSSIATE.—4d. per lb. for ton lots. GLASGOW: 4d. MANCHESTER: 4½d. to 5d.

SODIUM SILICATE.—£8 2s. 6d. per ton.

SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.

SODIUM SULPHATE (SALT CAKE).—Ground spot, £3 to £3 10s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 12s. 6d.

SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 10s.

SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

TARTARIC ACID.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1½d. per lb. GLASGOW: 1s. 1½d. per lb., 5%, ex store.

ZINC SULPHATE.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARYTES.—£6 to £6 10s. per ton, according to quality.

CADMIUM SULPHIDE.—3s. 0d. to 3s. 3d. per lb.

CARBON BLACK.—3½d. to 4 1/16d. per lb., ex store.

CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity. drums extra.

CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.

CHROMIUM OXIDE.—Green, 10½d. to 11½d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

INDIA-RUBBER SUBSTITUTES.—White, 4½d. to 5½d. per lb.; dark 3½d. to 4½d. per lb.

LAMP BLACK.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE.—Spot, 30%, £16 10s. per ton, 2-ton lots d/d in bags.

SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.

VERMILION.—Pale, or deep, 5s. per lb., 1-cwt. lots.

ZINC SULPHIDE.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1939; November, £7 8s.; December, £7 9s. 6d.; January, 1939; £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.

CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1939; November, £7 12s. 6d.; December, £7 13s. 9d.; January, 1939, £7 15s.; February, £7 16s. 3d.; March, £7 17s. 6d.; April/June, £7 18s. 9d.

NITRO CHALK.—£7 10s. 6d. per ton up to June 30, 1939.

SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1939.

CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 5½d. to 10d. per gal.; standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4½d. to 1s. 5d., pure 1s. 8½d. to 1s. 9d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d. MANCHESTER: Pure, 1s. 8d. to 1s. 8½d. per gal.; crude, 1s. per gal.

CARBOLIC ACID.—Crystals, 6½d. to 7½d. per lb., small quantities would be dearer; Crude, 60's, 1s. 7½d. to 1s. 10d.; dehydrated, 2s. 6d. per gal., according to specification; Pale, 99/100%, per lb. f.o.b. in drums; crude, 2s. 1d. per gal.

CREOSOTE.—Home trade, 3½d. per gal., f.o.r. makers' works; exports 6d. to 6½d. per gal., according to grade. MANCHESTER: 3½d. to 4½d. GLASGOW: B.S.I. Specification, 6d. to 6½d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils, 5½d. to 6½d.

CRESYLIC ACID.—97/99%, 1s. 6d. to 1s. 9d.; 99/100%, 1s. 9d. to 2s. 6d. per gal., according to specifications; Pale, 99/100%, 1s. 8d. to 1s. 10d.; Dark, 95%, 1s. 4d. to 1s. 5d. per gal.

GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. MANCHESTER: Pale, 99/100%, 1s. 8d. to 1s. 9d.

NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy, 90/190%, 1s. 1d. to 1s. 3d. per gal., naked at works, according to quantity. MANCHESTER: 90/160%, 1s. 5d. to 1s. 7d. per gal.

GLASGOW: Crude, 6½d. to 7½d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £4 10s. to £5 10s. per ton; purified crystals, £10 per ton in 2-cwt. bags.

LONDON: Fire lighter quality, £3 to £4 10s. per ton. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free).

MANCHESTER: Refined, £12 to £13 per ton f.o.b.

PITCH.—Medium, soft, 30s per ton, f.o.b. MANCHESTER: 27s. to 29s. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.

PYRIDINE.—90/140%, 12s. to 13s. 6d. per gal.; 90/160%, 10s. to 11s. per gal.; 90/180%, 3s. to 4s. per gal. f.o.b. GLASGOW: 90%, 140, 10s. to 12s. per gal.; 90%, 160, 9s. to 10s.; 90%, 180, 2s. 6d. to 3s. MANCHESTER: 11s. to 13s. 6d. per gallon.

TOLUOL.—90%, 1s. 1d. per gal.; pure 2s. 3d. GLASGOW: 90%, 120, 1s. 10d. to 2s. 1d. per gal. MANCHESTER: Pure, 2s. 3d. per gallon, naked.

XYLOL.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 3d. to 2s. 3½d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £6 15s. to £9 5s. per ton; grey, £8 5s. to £8 10s. MANCHESTER: Brown, £8 10s.; grey, £10.

METHYL ACETONE.—40.50%, £32 to £35 per ton.

WOOD CREOSOTE.—Unrefined, 6d. to 8d. per gal., according to boiling range.

WOOD NAPHTHA. MISCELL.—2s. 8d. to 3s. per gal.; solvent, 3s. to 3s. 3d. per gal.

WOOD TAR.—£3 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE. HCl.—2s. 7½d. per lb., 100% as base, in casks.

BENZOIC ACID.—1914 B.P. (ex toluol).—1s. 11½d. per lb. d/d buyer's works.

m-CRESOL.—98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

o-CRESOL.—30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.

p-CRESOL.—34.5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.

DICHLORANILINE.—2s. 1½d. to 2s. 5½d. per lb.

DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.

DINITROBENZENE.—7½d. per lb.

DINITROCHLOROBENZENE, SOLID.—£79 5s. per ton.

DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C., 11d.

DIPHENYLAMINE.—Spot, 2s. 2d. per lb., d/d buyer's works.

GAMMA ACID.—Spot, 4s. 4d. per lb. 100% d/d buyer's works.

H ACID.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.

NAPHTHIONIC ACID.—1s. 10d. per lb.

o-NAPHTHOI.—£97 per ton; flake, £94 8s. per ton.

a-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.

β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.

NEVILLE AND WINTHROP'S ACID.—Spot, 3s. 3½d. per lb. 100%.

o-NITRANILINE.—4s. 3½d. per lb.

p-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.

NITRONAPHTHALENE.—9½d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.

SULPHANILIC ACID.—Spot, 8½d. per lb. 100%, d/d buyer's works.

o-TOLUDINE.—10½d. per lb., in 8/10 cwt. drums, drums extra.

p-TOLUIDINE.—1s. 10½d. per lb., in casks.

m-XYLIDINE ACETATE.—4s. 3d. per lb., 100%.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BRITISH INDESTRUCTO GLASS, LTD., London, E.C. (M., 28/1/39.) Jan. 11, debenture and a charge collateral thereto, to Royal Bank of Scotland, securing all moneys due or to become due to the Bank; general charge and charged on land and buildings at Gorst Road and Park Royal Road, Acton. * £3,550. May 24, 1937.

STANDARD PULVERISED FUEL CO., LTD., London, W.C. (M., 28/1/39.) Jan. 10, £5,000 debentures, part of a series already registered. * Nil. Jan. 5, 1938.

UNITED STEEL COMPANIES, LTD., Sheffield. (M., 28/1/39.) Jan. 6, charge, supplemental to Trust Deed dated October 24, 1934; charged on certain seams of coal, etc., at Flimby. * £2,430,827. Oct. 28, 1938.

Satisfaction

JOSEPH BOAM, LTD., Leicester, oxide ochre and sand merchants, etc. (M.S., 28/1/39.) Jan. 16, £4,500, part of amount outstanding July 1, 1908.

Receiverships

PERIVALE FUR DYEING CO., LTD., London, W.C. (R., 28/1/39.) G. I. H. Davidson has ceased to act as receiver and manager. Jan. 12.

PREMIER BLEACHING CO., LTD., Preston. (R., 28/1/39.) T. H. Bailey has ceased to act as receiver and manager. Dec. 31.

Company Winding-up Voluntarily

BUSSEY COAL DISTILLATION CO., LTD. (C.W.U.V., 28/1/39.) H. Forbes-George, Bassishaw House, Basinghall Street, E.C.2, has been appointed liquidator. Jan. 11, 1939.

Company News

Genatosan, Ltd., have declared an interim dividend of 10 per cent. actual, less tax, on the ordinary shares for the year ending June 30, 1939 (same).

United Molasses Co., Ltd., have acquired the balance of the Commercial Solvents Corporation's interest in Commercial Solvents (Great Britain), Ltd., consisting of 28,500 ordinary £1 shares.

English Velvet and Cord Dyers' Association, Ltd., have announced that no dividend can be recommended on the 5 per cent. cumulative preference shares or on the ordinary shares for the year ended December 31, 1938.

English Clays Lovering Pochin and Co., Ltd.—At the annual meeting of the company recently, Lord Aberconway stated that the decrease in profits was due to the disturbed conditions on the continent and the recession of trade in the U.S.A. This had led to a substantial diminution in the export trade which formed such a large proportion of the company's business.

New Companies Registered

Camden Chemical Co., Ltd. 347,648.—Private company. Capital, £5,000 in £1 shares. To carry on the business of manufacturers of and dealers in chemicals, gases, drugs, medicines, etc. Subscribers: Harry B. Ringrose, 1/2 Finsbury Square, E.C.2; Chas. T. Shaw.

N. W. Spratt, Ltd. 347,673.—£10,000 in £1 shares. To carry on the business of manufacturers of and dealers in chemicals, gases, drugs, medicines, disinfectants, fertilisers, oils, colours, glues, gums, pigments, varnishes, etc. Subscribers: Herbert Scarfe, 6 Langham Close, Langham Road, N.15; Harold E. Lodge.

New Dyestuff and Chemical Co., Ltd. 347,806.—Private company. Capital, £100 in 100 shares of £1 each. To carry on business as merchants and dealers in and manufacturers of dyes, chemicals, etc. Subscribers: Gershon Levy, 32 Gresham Street, E.C.2; Constance L. Thorby. Registered office: 32 Gresham Street, E.C.2.

Forthcoming Events

London.

January 31.—Royal Institution, Albemarle Street, W.1. 5.15 p.m. M. Polanyi, "An Introduction to Chemical Mechanics."

February 2.—Sir John Cass Technical Institute, Jewry Street, Aldgate, E.C.3. 7 p.m. S. Judd Lewis, "Spectroscopic Analysis."

The Chemical Society. Burlington House, Piccadilly, W.1. 8 p.m. Meeting for the reading of original papers.

February 3.—Institute of the Plastics Industry. 8th annual dinner and dance. Grosvenor House, Park Lane, W.1. 7 p.m.

February 6.—University College. Gower Street, W.C.1. 5 p.m. Professor J. H. Burn, "The Action of Drugs in Muscular Fatigue and as Circulatory Restoratives."

Society of Chemical Industry. Burlington House, Piccadilly, W.1. 8 p.m. Dr. L. Levy and D. W. West, "Modern Applications of Luminescent Substances."

February 7.—Northampton Polytechnic. St. John Street, E.C.1. 8 p.m. S. Wernick, "A Decade of Progress in the Electro-Deposition of Metals: The Anodic Oxidation of Light Metals."

Chemical Engineering Group. Joint meeting with the Road and Building Materials Group of the Society of Chemical Industry. Burlington House, Piccadilly, W.1. Dr. L. A. Jordan and P. J. Gay, "Paint Research in Relation to Building."

Royal Institution. 21 Albemarle Street, W.1. 5.15 p.m. M. Polanyi, "An Introduction to Chemical Mechanics."

February 8.—Electrodepositors' Technical Society. Northampton Polytechnic Institute, St. John Street, E.C.1. 8 p.m. H. Sutton and J. W. W. Willstrop, "The Protective Qualities of Anodic Films," and N. D. Pullen, "Some Physical Characteristics of Anodic Films on Aluminium."

University College. Gower Street, W.C.1. 5 p.m. Professor J. H. Burn, "The Action of Drugs in Muscular Fatigue and as Circulatory Restoratives."

Bangor.

February 3.—Chemical Society. Joint meeting with the University College of North Wales Chemical Society. 5.30 p.m. Paper by Professor J. M. Gulland.

Birmingham.

January 30.—The Chemical Society. Joint meeting with the Birmingham University Chemical Society. The University, Edgbaston. 5 p.m. Professor J. L. Simonsen, "The Structure of Sesquiterpenes and their Derivatives."

February 2.—Institute of Metals. James Watt Memorial Institute, Great Charles Street. 7 p.m. G. W. Bailey, "Defects in Non-ferrous Ingots."

February 4.—Midland Chemists Committee. Annual dinner dance, Midland Hotel, New Street. 7 p.m.

Bristol.

February 2.—Chemical Society. Joint meeting with the Society of Chemical Industry. The University, Woodland Road. 7.30 p.m. Dr. M. Nierenstein, "The Natural Organic Tannins."

Coventry.

February 3.—Chemical Engineering Group. Joint meeting with the Birmingham Section and the Coventry Engineering Society. Coventry Technical College, The Butts. 7.45 p.m. H. L. Evans and S. T. Harrison, "Recent Developments in Bearing Metals."

Glasgow.

February 3.—Society of Chemical Industry. Royal Technical College. 7.30 p.m. Paper by W. G. Ogg.

Manchester.

February 3.—Society of Chemical Industry. Joint meeting with the Liverpool Section. Constitutional Club, St. Ann Street. 6 p.m. Professor H. L. Riley, "The Chemistry of Solid Carbon."

February 7.—Institute of Fuel Engineers' Club, Albert Square. 7 p.m. R. B. Robinson, "Pitch as a Fuel."

Newcastle.

February 8.—Society of Chemical Industry. Symposium: Pigment Manufactures, Fine Particles.

Swansea.

February 3.—Chemical Society. Joint meeting with the University College of Swansea Chemical Society. University College. 6 p.m. Professor W. F. K. Wynne-Jones, "Reactions Involving Proton Transfer."

Books Received

Weeds, Weeds, Weeds.—By Sir Charles Vernon Boys. 2nd edition. London: Wightman and Co., Ltd. Pp. 115. 2s.

Theoretical Qualitative Analysis. By J. H. Reedy. London: McGraw-Hill Publishing Co., Ltd. Pp. 451. 18s.

Revision Notes in Inorganic Chemistry. By E. P. Wilson and F. W. Ambler. London: William Heinemann, Ltd. Pp. 240. 4s.

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